Now from Goodyear—

positive drive **BELTS**

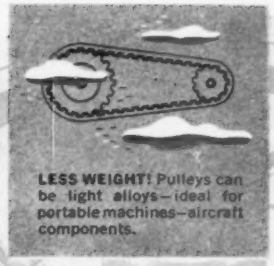
—the positive answer to the need for a quality tooth-meshed belt

Here is Goodyear quality in a transmission belt that opens the door to important advances in the design of machines and appliances.

For the Goodyear Positive Drive Belt was developed with the designer in mind—after careful study of his needs by the G.T.M.—Goodyear Technical Man. It makes possible important economies in weight, space and construction—on drives up to 600 h.p. and speeds to 16,000 f.p.m. And, most important, it's completely reliable—built to the notably higher standards of Goodyear quality.

Why not, then, ask the G.T.M. to drop by and give you complete specs on Goodyear Positive Drive Belts. He'll be glad to work with you in determining your best use of standard belts—or special sizes built to your requirements. Just contact him through your Goodyear Distributor—or by writing Goodyear, Industrial Products Division, Lincoln 2, Nebraska, or Akron 16, Ohio.

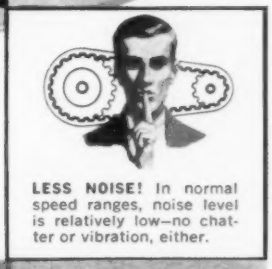
Goodyear Positive Drive Belts are manufactured under license and according to U.S. Patents 2,507,852 and 2,397,312.



LESS WEIGHT! Pulleys can be light alloys—ideal for portable machines—aircraft components.

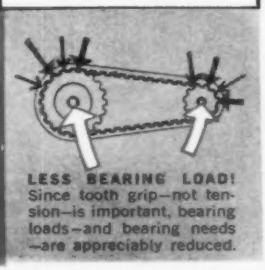
LESS SPACE! You can combine small pulleys, short centers and narrow belts of high capacity—a real space-saver.

LESS MAINTENANCE! Since there's no metal-to-metal contact, you can eliminate lubrication systems and devices.



LESS NOISE! In normal speed ranges, noise level is relatively low—no chatter or vibration, either.

LESS HEAT! Elimination of inherent friction—lack of high tension and thin belt construction bar heat build-up.



LESS BEARING LOAD! Since tooth grip—not tension—is important, bearing loads—and bearing needs—are appreciably reduced.

POSITIVE DRIVE BELTS BY

GOODYEAR 60 ANNIVERSARY

THE GREATEST NAME IN RUBBER

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with the editors in field and office

Edited by R. L. Marinello

Hope to See You at Booth 302

WHEN ATTENDING the Plant Maintenance and Engineering Show in Cleveland—January 26 through the 29—don't forget to stop at Booth 302. PLANT ENGINEERING editors would like to meet as many readers as is possible in the few days the show will be on.

This is the one time each year when so many plant engineers can get together, and we hope all of you who are planning to attend the show will make it a point to include, in your tour around the show, a visit to our booth.

January Conferences and Shows

THE 14TH International Heating and Air Conditioning Exposition will be held in Convention Hall, Philadelphia, from January 26 through the 29. Further information may be obtained by writing to International Exposition Company, 480 Lexington Ave., New York 17, N. Y.

The Society of Plastics Engineers will hold their 15th Annual Technical Conference at the Hotel Commodore, New York, N. Y., from January 27 through the 30. For further data on this conference, address your inquiry to Society of Plastics Engineers, Inc., 65 Prospect St., Stamford, Connecticut.

Fifth Annual Midwest Welding Conference will be held on January 28 and 29 at the Illinois Institute of Technology, Chicago, Illinois. The program will include 12 papers dealing with the latest developments in welding processes and applications. Inquiries concerning the conference should be addressed to Harry Schwartzbart, Supervisor of Welding Research, Armour Research Foundation, 10 W. 35th St., Chicago 16, Illinois.

Standard on Incinerators

IMPORTANT CHANGES in the design, construction and installation of incinerators are covered in the revised standard issued by the National Fire Protection Association.

New material on clearances, mounting and flue connections are among the changes included in the standard, which applies to commercial and industrial type as well as domestic and apartment house incinerators.

Copies of the standard on incinerators, NFPA No. 82 (24 pages, 50 cents) may be obtained from the National Fire Protection Association, 60 Batterymarch St., Boston 10, Mass.

All Engineers Luncheon

AS MANY READERS know, each year for the past five years an All Engineers Luncheon has been planned for the second day of the Plant Maintenance and Engineering Conference and Show. This coming year the luncheon will be held on Tuesday, January 27, at the Hotel Cleveland, Cleveland, Ohio.

The guest speaker at the luncheon will be Dr. Herbert True. More information about the speaker and a coupon which you can use to make your reservation appear in this issue on page 110.

Plant Engineer Gets New Post

Lawrence P. Hallahan has been appointed to the newly created position of plant engineer of the Phosphorus Division of Hooker Chemical Corporation's plant in Jeffersonville, Indiana. He was formerly plant engineer of the company's subsidiary chlorine-caustic soda plant located in North Vancouver, British Columbia.

Born in Worcester, Mass., he received his B.S. degree in chemical engineering from Worcester Polytechnic Institute in 1948. After working as a chemical engineer with National Aniline Division of Allied Chemical and Dye Corp., and as a chemist with O-Cel-O, Inc., he returned to Worcester Polytechnic Institute and was awarded an

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The American Coils Company plant in Freehold, N.J., is typical of Natco Uniwall installations; attractive, durable and economical in both initial cost and long-term maintenance requirements.

Look to Natco for the new look

in moderate-cost plant construction and modernization

Single-unit wall construction with Natco Uniwall offers:
modern appearance
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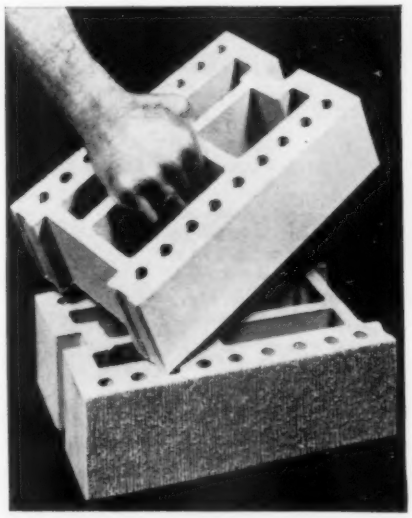
maximum utility
minimum maintenance

Natco Uniwall provides finished walls inside and out with one unit in one operation. Exterior finish is a natural buff Rugg-tex surface, while the interior facing, available in a variety of compatible colors, is ceramic glazed.

Sizable economies may be achieved through the use of Natco Uniwall, a structural clay load-bearing facing tile, that serves double duty by providing modern finished walls *inside* and *out* with one unit in one operation. The small number of shapes required to meet every construction detail and Uniwall's easy handling characteristics often reduce construction costs even further.

Maintenance costs are low with Uniwall since only occasional soap and water cleaning is needed to keep the interior ceramic glazed walls permanently bright and colorful. Uniwall is fireproof, vermin-proof and highly resistant to acids, alkalies and physical abuse. Costly repairs are virtually eliminated.

Consult your nearest Natco branch office for complete details on Uniwall Facing Tile, or write for Natco Technical Bulletin UW 100-5.



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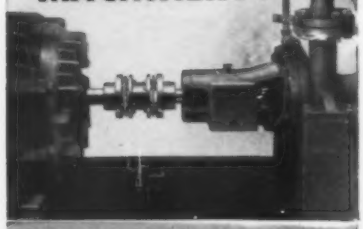

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'ROUND ABOUT

M.S. degree in chemical engineering.

He joined Hooker at Niagara Falls, N. Y., as a chemical engineer. In 1954 he became departmental engineer in the plant near Niagara Falls which Hooker operated for the Atomic Energy Commission. In 1956 he was made plant engineer for the North Vancouver plant, then under construction, and served there until his present appointment.

Plant Engineering—Pint Size

INDUSTRIAL PLANT libraries and public libraries can now get the 1957 issues of PLANT ENGINEERING, Volume 11, on microfilm. Volume 11 is available at $9.10, plus postage.

This volume or any of the previous volumes of PLANT ENGINEERING can be obtained from University Microfilms, Ann Arbor, Michigan.

Please note that distribution of these films is limited to firms and individuals on our controlled and subscription lists.

Plant Engineer Moves Up

Gradon F. Willard, former plant engineer with a chemical engineering background, has been appointed manager of the Navy HiCal Plant, under construction here at Muskogee, Oklahoma, by Callery Chemical Company.

He joined Callery in 1955 after employment as a plant engineer for Great Lakes Chemical Company. His first assignment at Callery was as project engineer. Later, he became a chief project engineer, then production manager of the Muskogee HiCal Plant. Last March, he was named assistant plant manager.

New Standard for Power Cranes and Shovels

INDUSTRAL USERS of power cranes and shovels will be interested in the new standard recently published.

Purpose of the standard is to establish uniform methods for the guidance of manufacturers, distributors and users in specifying power cranes and shovels and in presenting data concerning them. It is designed to serve as the basis for a common understanding between buyer and seller in determining the capabilities of the machines and to provide for the use of a label denoting that the equipment complies with the requirements of the standard.

Copies of the new standard, CS 90-58, may be obtained from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price 20 cents.

Noise Control Conference

DISCUSSIONS ON methods of controlling noise and an open question period are planned for the two-day conference on "Noise Control in Buildings." The conference will take place at the New Yorker Hotel, New York City, on January 14 and 15.

The program has been divided into four major categories: Fundamentals of Noise Control; Control of Transmitted Sound; Control of Noise in Air Conditioning and other Mechanical Equipment. Speakers will include such authorities as J. F. Weinhold, director of the physical plant for Cornell University; H. T. Noyes, chief engineer for Turner Construction Co.; H. C. Hardy of Howard C. Hardy Associates, and R. B. Newman of Bolt, Beranek and Newman.

On the opening day, one interesting program segment will be titled, "The Building Industry Wants to Know." In this session an architect, a builder, and a building owner and user will present the things they want to know about noise control.

Those wishing copies of the final program and registration information may contact Building Research Institute, Technical Secretary Harold Horowitz, National Academy of Sciences, 2101 Constitution Ave., Washington 25, D. C.

Appointed Plant Engineer

Alexander M. Beebee, Jr., has been appointed plant engineer of the Rochester Products Division of General Motors Corporation. He joined Rochester Products in 1950 and has been serving as assistant superintendent of plant engineering since 1956.

A native of Rochester, he is a graduate of Brighton High School. He attended Cornell University and graduated with a bachelor's degree in mechanical engineering.

In 1946, Mr. Beebee joined the Bausch & Lomb Optical Company and served with that firm in various engineering and maintenance capacities until 1950 when he joined Rochester Products Division.

for greater strength . . . easier assembly

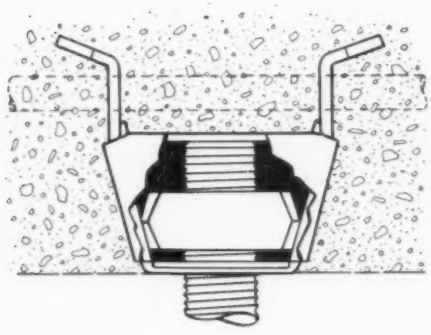
The new Grinnell Wedge Type Concrete Insert

Fig. 281

NEW design features give Grinnell's Wedge Type Concrete Insert (Fig. 281) greater load carrying capacity . . . 1200 lbs. for ⅝" and ¾" sizes, with a safety factor of at least 5 to 1.

Heavy gauge steel is die-formed into a wedge-shaped box housing. When load is attached to the inserted nut and rod assembly, ends of the elongated nut press on the wedge-slanted walls.

These walls, acting in compression with the concrete, provide strength unmatched in steel inserts of equal size.



Preassembly of the elongated nut on the rod makes quick assembly possible.

Installations can be made in quick time, too. Just a few turns of the rod tighten the nut rigidly in place. Slightly loosening the nut permits lateral adjustment along the full length of the slot, without fear of rod and nut falling out of the body.

Single body size accommodates four different interchangeable nut and rod sizes, to make ordering easier and installation simpler—especially where hanger rod sizes cannot be determined in advance of ceiling construction.

On your next project, specify Grinnell Concrete Inserts — either steel or malleable iron. Quality manufactured . . . *and priced right!* Grinnell Company, Inc., Providence 1, R. I.

CB-Universal Malleable Iron Concrete Insert (Fig. 282)

CB-Junior Malleable Iron Concrete Insert (Fig. 279)

Wrought Steel Concrete Insert (Fig. 280)

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Here's a quick way to beat construction costs—

USS Galvanized Steel Sheets

You've probably seen it happen in your own plant: Expansion is a must . . . but the construction time and cost estimates are so high that they discourage expansion plans. Not so when the plans call for a building clad with USS Galvanized Steel Sheets.

Compare prices . . . USS Galvanized Steel Sheets cost less than other types of metal roofing and siding. They are easy to put up. Once the framework is erected, it takes only a few days to cover an entire building with USS Galvanized Steel Sheets. No special construction team has to be hired. Regular construction crews or your own plant maintenance crew can do the job.

The strength of the steel and the formed pattern of the sheet make a weathertight covering that will not buckle, bulge, or sag. The building *stays* tight because bolt and nail holes in *steel* will not easily enlarge and let the sheets work themselves loose.

If you plan to build, or repair buildings at your plant, do it the quick, low-cost way with USS Galvanized Steel Sheets. They are available in a variety of sizes and patterns. Ask your steel supplier about USS "Storm Seal," USS V-5 Crimp, or USS Corrugated Galvanized Steel Sheets.

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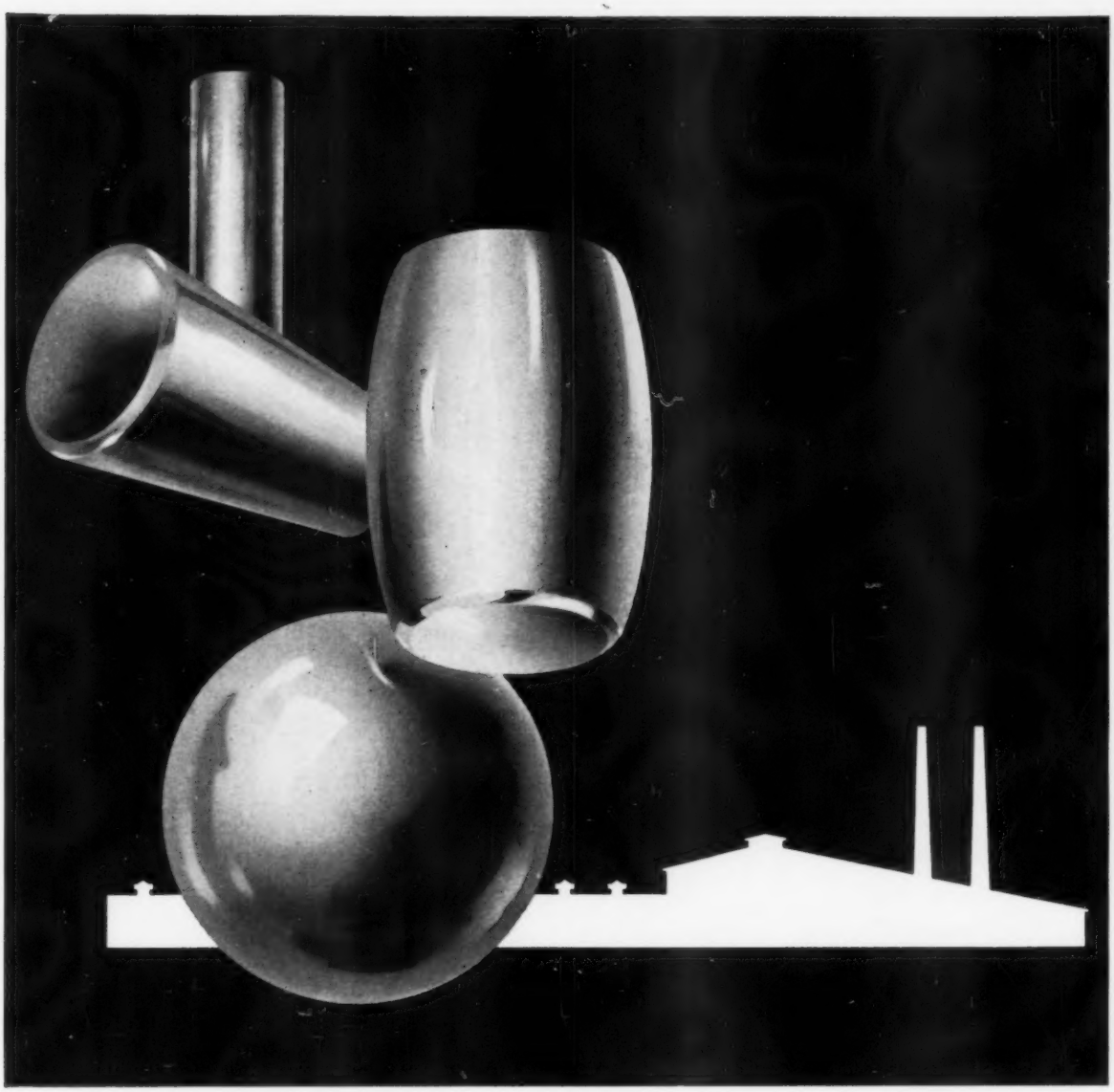
. . . every product, process, and service your complex job involves



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Here is one multi-purpose grease that actually performs better than a great many "special purpose" greases for all types and sizes of bearings – even under extreme *pressure*, *temperature* and *moisture* conditions.

Nebula EP retains its outstanding lubricating properties at temperatures above the limits of a number of special heat-resistant greases. But unlike many high-temperature greases, Nebula EP possesses high anti-wear and load-carrying qualities – comparable to those of most specialized extreme-pressure greases. Nebula EP's *constant consistency-temperature characteristics are among its most outstanding features.* And Nebula EP's excellent oxidation stability assures long service and storage life.

Now available in three grades, Nebula EP is well suited to *all* types and sizes of bearings...can be applied by hand packing, grease cup or gun, or through a centralized system. For further information, contact your nearest Esso office in New England, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, the Carolinas, Tennessee, Arkansas, Louisiana, and the District of Columbia. Or write Esso Standard Oil Company, 15 West 51st Street, New York 19, N. Y.

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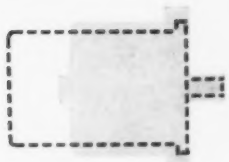

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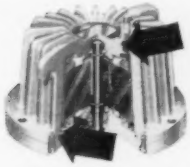

SEALED FOR SUBMERGED
APPLICATIONS

New-product news from Louis Allis

Underwater is home for this motor!

New Louis Allis Immersible motor is built to operate in water, sewage, or liquid chemicals

The Immersible motor can be adapted to operate in any kind of liquid — fresh or salt water, sewage, chemicals, or abrasive industrial cutting oils. It's the ideal means to provide power in a vat or sump — at the bottom of a pool, lake, or ocean!

No matter how deep your setting, the Immersible motor provides close-coupled power — saves you the need for expensive jack-shafting, intermediate bearing supports between pump and a surface-mounted motor, and mounting structures.

The motor is oil-filled and sealed at the factory. Diaphragm breathers equalize internal and external pressure — eliminate pressure at the shaft seal and prevent leakage. All joints are sealed to keep water and dirt out. Vinyl-coated housing and stainless or suitably plated exposed parts resist corrosion. Mating surfaces of the housing and flange are precisely machined to provide accurate alignment of the pump impeller and casing.

The Immersible, as shipped, is ready for horizontal or vertical mounting on pumps, agitators, mixers, or special equipment. Sizes range from ¾ to 40 hp. For additional information contact your local Louis Allis District Office, or write for Bulletin 2300, The Louis Allis Co., 434 East Stewart Street, Milwaukee 1, Wisconsin.

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

LOUIS ALLIS

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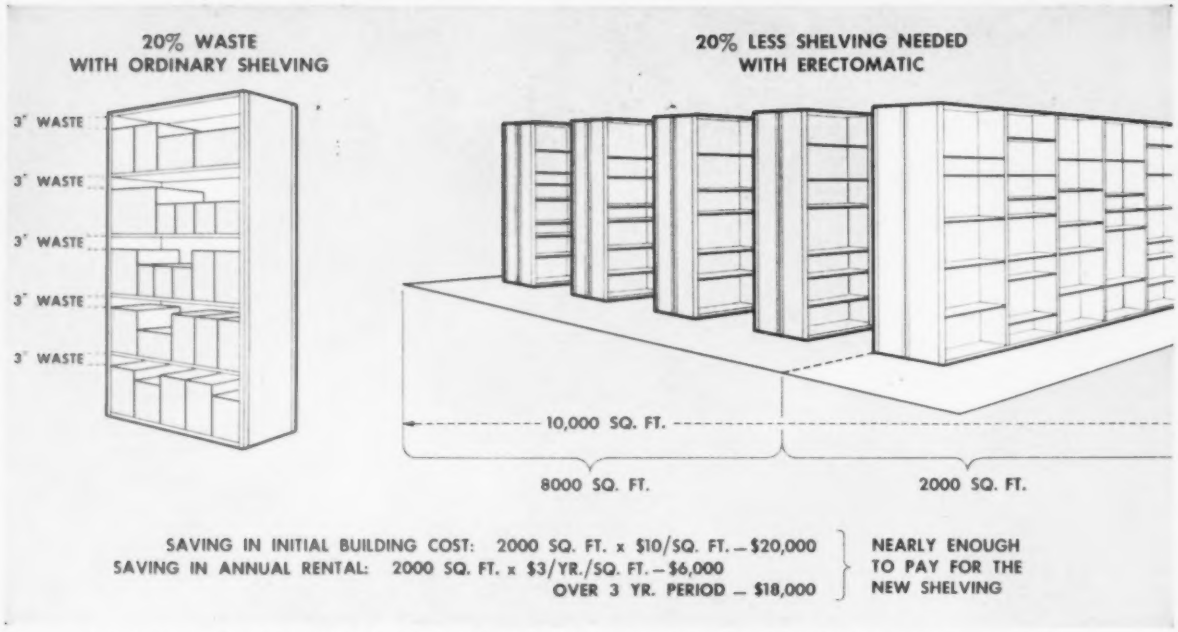

A typical example of the savings in space made possible by Hallowell ERECTOMATIC steel shelving is illustrated above.

8000 square feet of Hallowell *ERECTOMATIC* Steel Shelving can hold as much as 10,000 square feet of ordinary shelving

Reduction in floor space and shelving is made possible by quick-change shelf positioning and exclusive corner post construction, permitting more effective utilization of area between shelves.

More effective utilization of the area between shelves can provide major savings in industrial and commercial shelving installations—whether you own, rent, or are planning to build the area required for storage.

Hallowell ERECTOMATIC® Steel Shelving permits such utilization. Quick-change shelf positioning eliminates waste in vertical spacing, increases the usable storage area by as much as 20%. Exclusive corner post construction permits full utilization of shelf width, too. Typical savings in initial building costs and annual costs are listed in the tables opposite. Ask your authorized Columbia-Hallowell dealer for details.

Or write Columbia-Hallowell Division, SPS, Jenkintown 26, Pa. or SPS Western, Santa Ana, Calif.

SAVINGS IN INITIAL BUILDING COSTS
(per 100 sq. ft. of storage space eliminated)

% floor space saved by ERECTOMATIC	Building cost per 100 sq. ft.								
	$700	800	900	1000	1100	1200	1300	1400	1500
5	$ 35	40	45	50	55	60	65	70	75
10	70	80	90	100	110	120	130	140	150
15	105	120	135	150	165	180	195	210	225
20	140	160	180	200	220	240	260	280	300

SAVINGS IN ANNUAL COST
(per 100 sq. ft. of storage area saved)

% floor space saved by ERECTOMATIC	Cost (per year) per 100 sq. ft.									
	$100	200	300	400	500	600	700	800	900	1000
5	$ 5	10	15	20	25	30	35	40	45	50
10	10	20	30	40	50	60	70	80	90	100
15	15	30	45	60	75	90	105	120	135	150
20	20	40	60	80	100	120	140	160	180	200

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TPA 353

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Gates Suction Hose drains ditch on 2300-mile Trans-Canada pipeline

Industry everywhere depends upon Gates Industrial Hose to provide air, water, steam, oil and suction for every type of application . . . including some of the toughest jobs in the world.

Tens of thousands of miles of Gates Hose are in daily use . . . every type and size from air hose the diameter of a pencil to petroleum hose as big as the mains in city streets.

Back of the world-wide acceptance of Gates Hose is a continuing program of *specialized* hose research at the multi-million dollar Gates Research Center staffed by more than 200 chemists, physicists, engineers and technicians.

This *specialized* research aims to increase hose utility and life . . . and to lower industry's annual hose costs.

Because Gates Hose is so widely preferred, it is quickly available from leading distributors in all industrial centers in the United States and in 90 countries throughout the world . . . and its performance is guaranteed by the

World's Largest Maker of V-Belts.

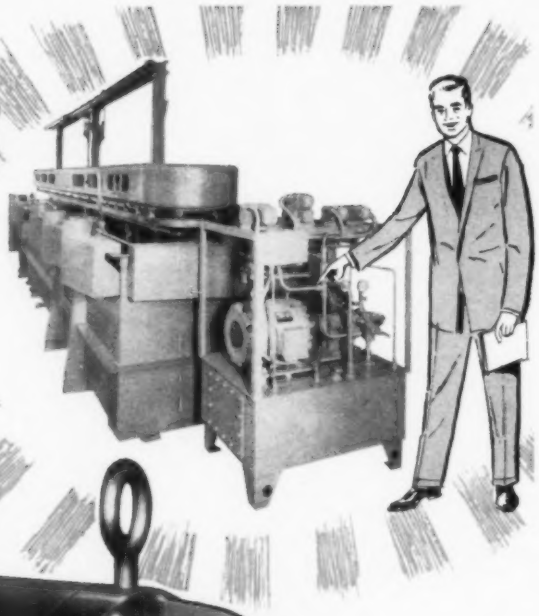
Gates 500SB Contractors' Suction Hose —a heavy duty water suction and discharge hose for conveying large volumes of water in trench and sewer work. Heavy spring steel wire and multiple plies make it virtually crush proof. This rugged hose, one of the wide variety of industrial hoses made by Gates, is readily available from your nearby Gates distributor.

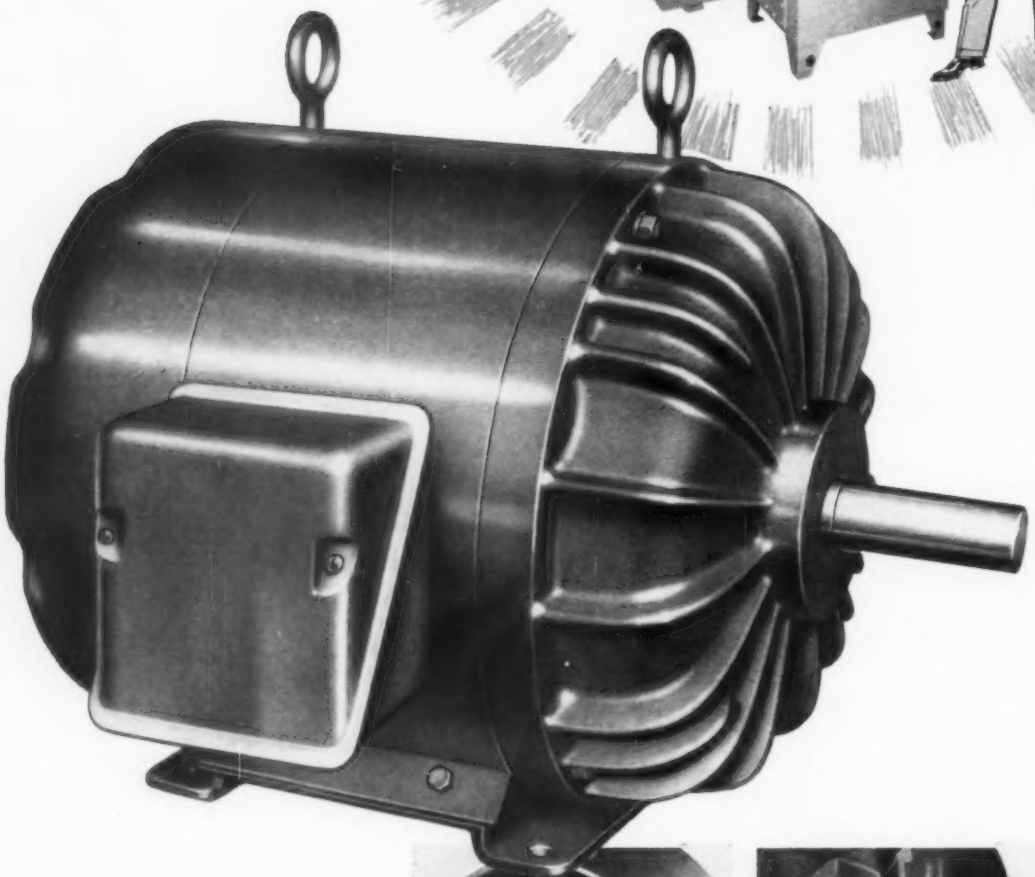
The Mark of Specialized Research — Gates — The Gates Rubber Company • Denver, Colorado

Gates Industrial Hose

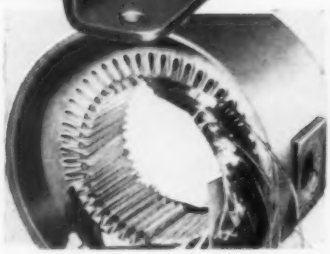
Made in a Full Range of Types and Sizes

Udylite's

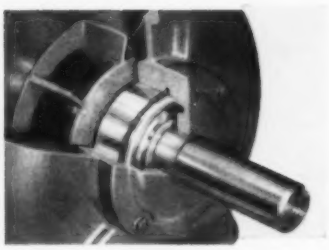




Robbins & Myers
build motors from
1/200 to 200 horsepower



MYLAR* INSULATION INCREASES MOTOR LIFE . . . insures positive insulation. Rag paper backing provides cushioning effect against abrasions and punctures. Entire motor winding is pre-heated, twice dipped in varnish and baked after each dip.



BEARINGS POSITIVELY SEALED . . . Double row width ball bearings, sealed on both sides, eliminate frequent re-lubrication. Grease sealed in extra-large reservoirs, resists dust, temperature, humidity and high operating speeds.

*DuPont registered trademark

"shining example" shows how...

R&M TOTALLY ENCLOSED FAN COOLED MOTORS BEAT CORROSIVE ATMOSPHERES

Udylite Corporation's famed Automatic Plating Machines put a shine on everything from sewing machine parts to automobile bumpers. R&M Totally Enclosed Fan Cooled Motors power the hydraulic system of these precision machines quietly, smoothly and without vibration. But most important they successfully combat the severe corrosive atmosphere common to all plating operations. R&M Motors are completely protected against this serious motor menace.

Complete R&M motor protection includes careful dipping, baking and painting of all steel parts . . . spraying of rotor and shaft with special rust-inhibitor . . . application of anti-corrosion primer to cast-iron end-heads and terminal box. A cast aluminum fan provides effective cooling by forcing air between enclosed internal and open external shells over motor's entire length. Other important features contributing to long-life protection and vigorous performance are described at left, below.

Robbins & Myers Totally Enclosed Motors range from ½ to 125 hp. Write today for Bulletin 500 PE

OPEN PROTECTED MOTORS . . . R&M open protected motors to 200 horsepower are suitable for many applications formerly requiring totally enclosed construction. Investigate this economical possibility for your application. Write for free Bulletin 520.

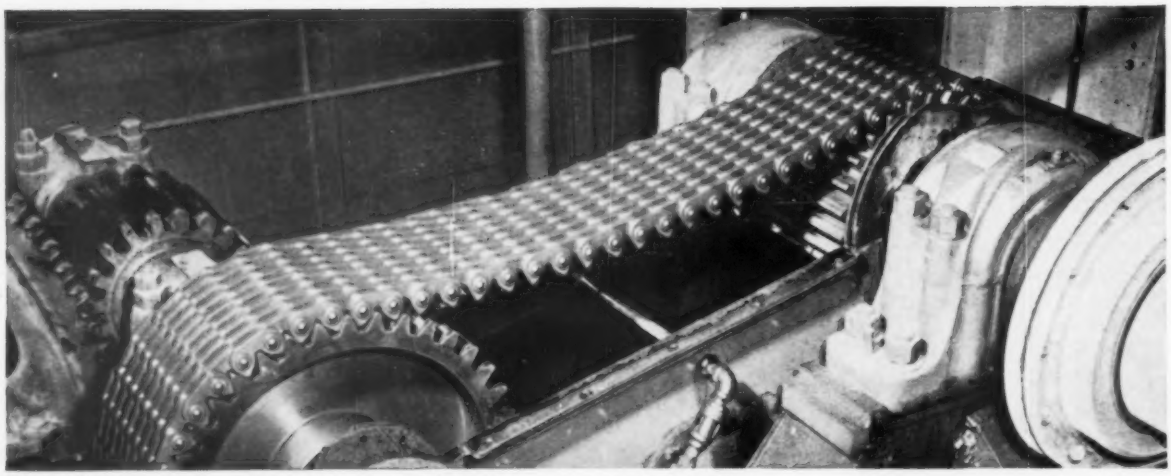
ROBBINS & MYERS, INC.

SPRINGFIELD, OHIO / BRANTFORD, ONTARIO

MOTORS FANS HOISTS MOYNO PUMPS INDUSTRIAL PROPELLAIR FANS

R&M

For more facts circle 512 on Reply Card



HIGH SPEED. Traveling at speeds as high as 5000 fpm, silent chain drives readily accommodate the extreme peak loads without losing their better-than-98% efficiency.

How LINK-BELT silent chain drives survive industry's roughest requirements

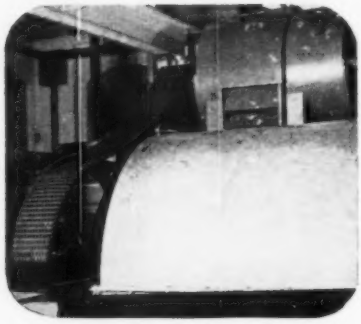
Would your drives do as well?

On applications like these and scores more, no other type of drive is the equal of Link-Belt silent chain. Ask your Link-Belt office or authorized stock-carrying distributor for comprehensive 88-page Book 2425.

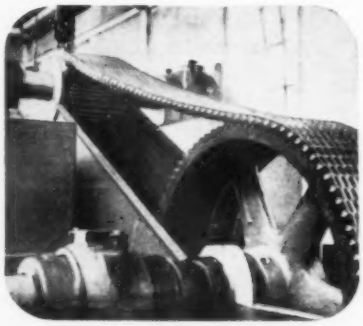
LINK-BELT

SILVERSTREAK SILENT CHAIN DRIVES

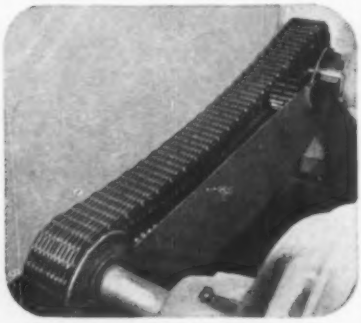
LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville (Sydney), N.S.W.; South Africa, Springs. Representatives Throughout the World. 14.679



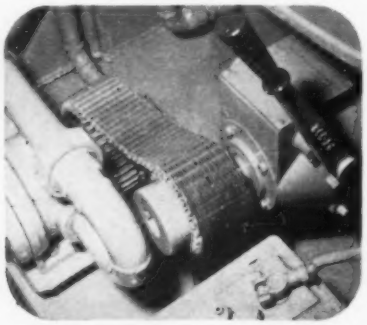
LARGE OR SMALL HP. On a 300 hp drive like this or at fractional hp, silent chain is always lower in ultimate cost.



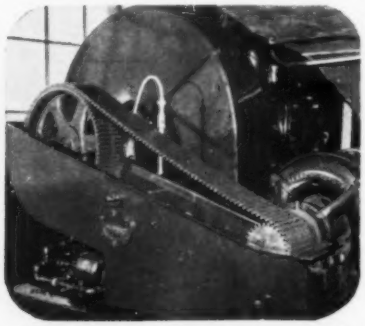
LARGE RATIOS. Link-Belt silent chain operates efficiently on extremely short centers at ratios as high as 10-to-1.



ADVERSE OPERATING CONDITIONS. Heat, humidity and cold have little effect on Link-Belt silent chain drive performance.

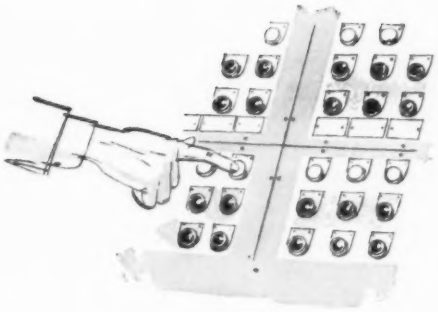


LIMITED SPACE. Easy to assemble in close quarters, Link-Belt silent chain permits built-in drives, compact housings.



LONG LIFE. This drive is 16 years old and still going strong. Not unusual—many others have lasted twice that long.

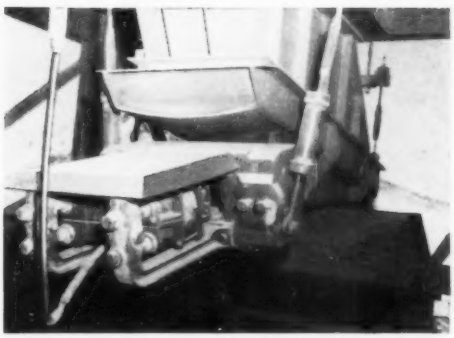
For more facts circle 513 on Reply Card



Fingertip control with

JEFFREY VIBRATING FEEDERS

...one man runs stone reclaiming operations, screening and washing plant, secondary crushers



Get details on how Jeffrey vibrating equipment and controls can simplify your materials handling job and save you money.

THIS quarry produces both high calcium limestone and dolomite products. From a strictly operating standpoint, *one man at a Jeffrey-designed control panel* runs the screening and washing plant, two secondary crushers and reclaiming operations monitored by 15 Jeffrey vibrating feeders.

Jeffrey feeders under primary surge piles feed stone to the plant via reclaiming tunnel belt conveyor. Vibrating grizzlies with bars on 3" centers allow fine material to fall to belt conveyors ahead of coarser stone, insuring longer life for the belt.

Jeffrey vibrating feeders were also selected for reclaiming finished stone from stockpiles. At these feeders, flow of stone actuates a swing baffle which signals control panel operator that material is flowing properly. Even blends of stone can be obtained by regulating flow from stockpiles to reclaiming belt ... through remote-controlled Jeffrey vibrating feeders.

Write for Catalog 930. The Jeffrey Manufacturing Company, 853 North Fourth Street, Columbus 16, Ohio.

CONVEYING • PROCESSING • MINING EQUIPMENT...
TRANSMISSION MACHINERY...CONTRACT MANUFACTURING

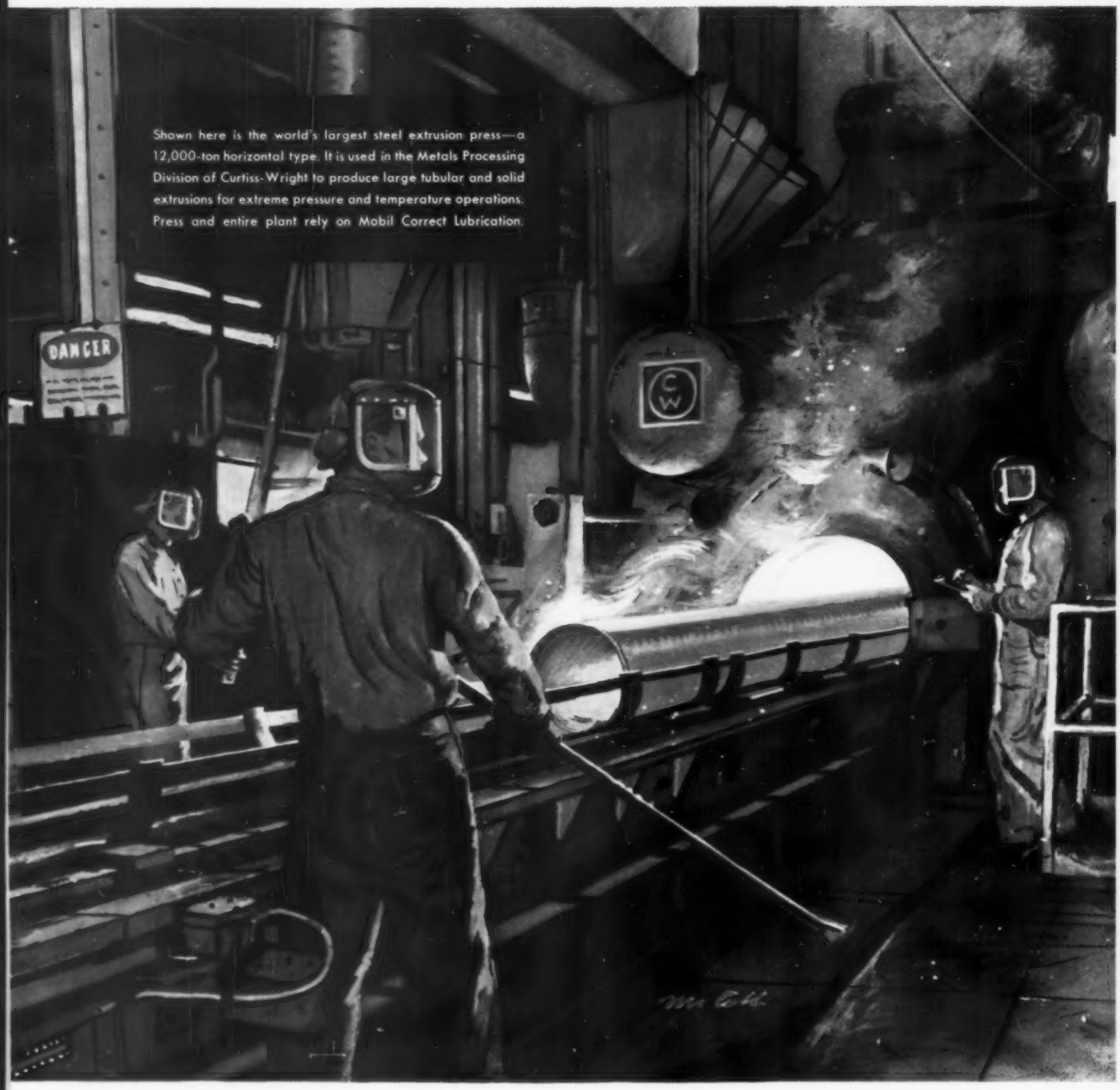
JEFFREY

For more facts circle 514 on Reply Card

For more facts circle 515 on Reply Card ——→

Correct Lubrication in Action...

How Mobil saved



Shown here is the world's largest steel extrusion press—a 12,000-ton horizontal type. It is used in the Metals Processing Division of Curtiss-Wright to produce large tubular and solid extrusions for extreme pressure and temperature operations. Press and entire plant rely on Mobil Correct Lubrication.

Mobil

Complete Engineering Program
Proved Petroleum Products

Mobil

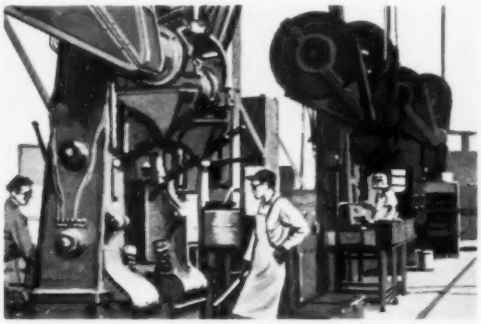
SOCONY MOBIL OIL CO., INC., and Affiliates: MAGNOLIA PETROLEUM CO., GENERAL PETROLEUM CORP., MOBIL OVERSEAS OIL CO., INC.

Curtiss-Wright $8,589

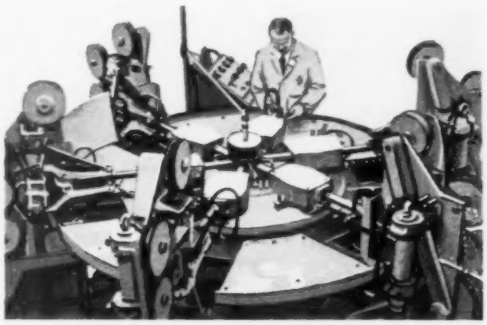
Every time Curtiss-Wright's Metal Processing Division receives a lubricant shipment a big savings is made. Why? Because a Mobil man suggested a new purchasing pattern which brought substantial discounts. Another recommendation saved $1,152 in the company's forging shop.

Here are but two instances of Mobil's imaginative engineering service—an important part of *Correct Lubrication.* Alert, qualified engineers in this plant—*but not on the payroll*—have helped save over $8,589.78 in the last year alone. They have worked closely with Curtiss-Wright engineers, setting up maintenance systems, recommending products and methods that have cut downtime . . . improved production in numerous ways.

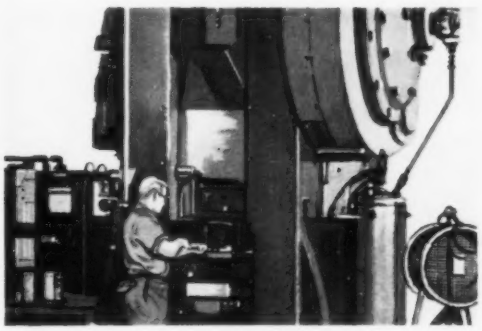
If you purchase lubricants . . . if you're interested in improving company profits . . . it will pay you to investigate Mobil *Correct Lubrication.* This comprehensive lubrication program often more than pays for itself—in profits!



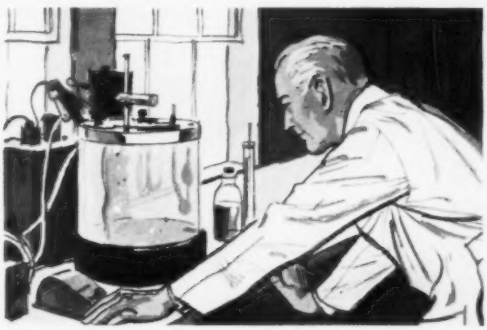
Bearings on drop hammers in Curtiss-Wright's forging shop failed after ten months. Mobil recommended a grease that extended bearing life five years . . . saved $1,152 every ten months.



Curtiss-Wright saves by re-using hydraulic oil as coolant for polishing machine. This saving is part of oil reclamation program organized by Mobil and plant lubrication supervisor. Altogether savings total $5,392 annually.



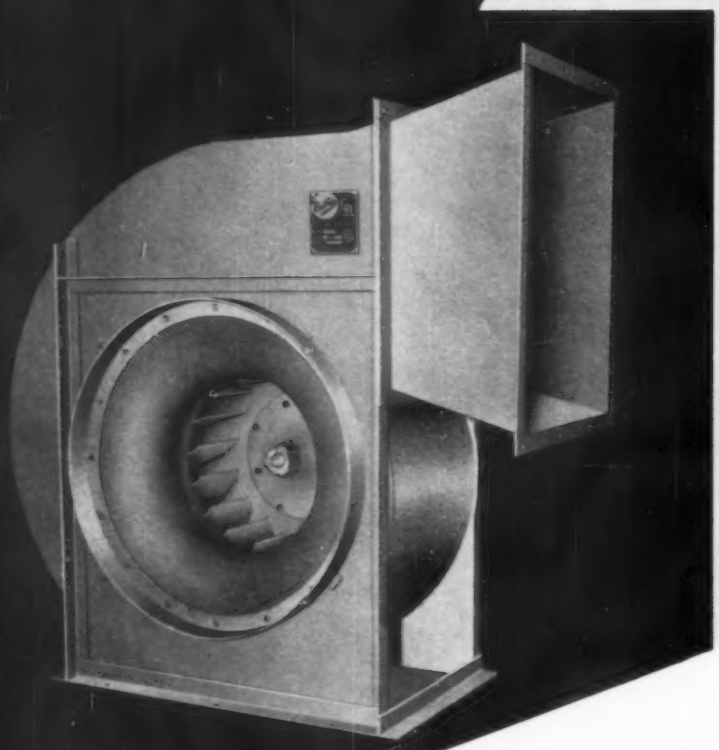
Bull gears on giant presses required application of grease every week. Mobil recommended improved product that extended application period to monthly intervals . . . cut grease consumption 76% . . . cut application cost $665 per year.



Cooling and lubricating emulsion on cut-off saw broke down into curdly mass. Mobil laboratory analysis pinpointed contamination source. Adding an inexpensive chemical eliminated shutdown and cleaning operation.

Correct Lubrication

Another reason You're Miles Ahead with Mobil!



"Buffalo" Type "CR" Radial Blade Fan

Widely-used in rugged steel mill applications, the "Buffalo" Type "CR" Radial Blade Fan is unsurpassed for dependable and long-lasting service under the most severe industrial conditions.

The "CR" is unique in the fact that the same design principles which reduce wear actually increase the efficiency of these husky fans. An engineering refinement of the radial blade principle — plus a new high in streamlining the entire fan, from inlet through wheel to outlet — boosts performance at the same time that it cuts down wear. (See drawings at left.)

Add to these wear-resistant **design principles** the long-standing "Buffalo" tradition of heavy-duty reliable **construction features,** and you have an unbeatable combination of factors contributing to maximum efficiency and minimum wear.

DESIGNED FOR PERFORMANCE UNDER DEMANDING CONDITIONS

Streamlined housing and gradually diverging outlet not only increase static efficiency, but reduce housing wear because of minimum turbulence.

Mating sections of the inlet and wheel flange form a true-half-circle. Resultant smooth air flow further reduces wear and provides peak performance.

Investigate this high performance fan, designed for severe industrial service. Ask your nearby "Buffalo" Engineering Representative for full details on the "CR", or write for Bulletin FD-205.

Every "Buffalo" Fan features the famous "Q" Factor — the built-in QUALITY that provides trouble-free satisfaction and long life.

"Buffalo"

BUFFALO FORGE COMPANY

BUFFALO, N. Y.

Buffalo Pumps Division, Buffalo, N.Y. • Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

VENTILATING • AIR CLEANING • AIR TEMPERING • INDUCED DRAFT • EXHAUSTING • FORCED DRAFT • COOLING • HEATING • PRESSURE BLOWING

For more facts circle 516 on Reply Card

no more knuckle-busting . . .

New RIDGID No. 450 Portable Tristand Chain Vise

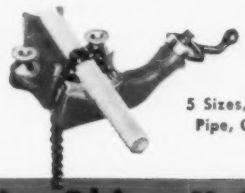
has Large Easy-to-Operate Top Screw Handle right up on top

Capacity, ⅛" to 5"
Weight, 42½ Lbs.

Here's a real time saver. Not only do you get a complete work-bench that's truly portable, but now you get a chain vise that's extra easy and fast to operate. Handle is right up on top where it's always handy. Handle and tightening nut are anchored to vise base . . . can't pull out.

Vise base, that overhangs front legs for clear tool swing, has hanger slots for tools, 3-size pipe bender, rear pipe rest and adjustable ceiling brace screw. Folding legs and integral tray set up easily and lock in position for rigid work base. Snap chain holds folded legs closed for easy carrying . . . no loose parts. Rubber grommets in tristand feet prevent creeping. See and try this more-for-your-money RIDGID Top Screw Chain Vise at your Supply House!

New RIDGID Bench Chain Vises have same Extra-Efficient Top-Screw Adjustment...

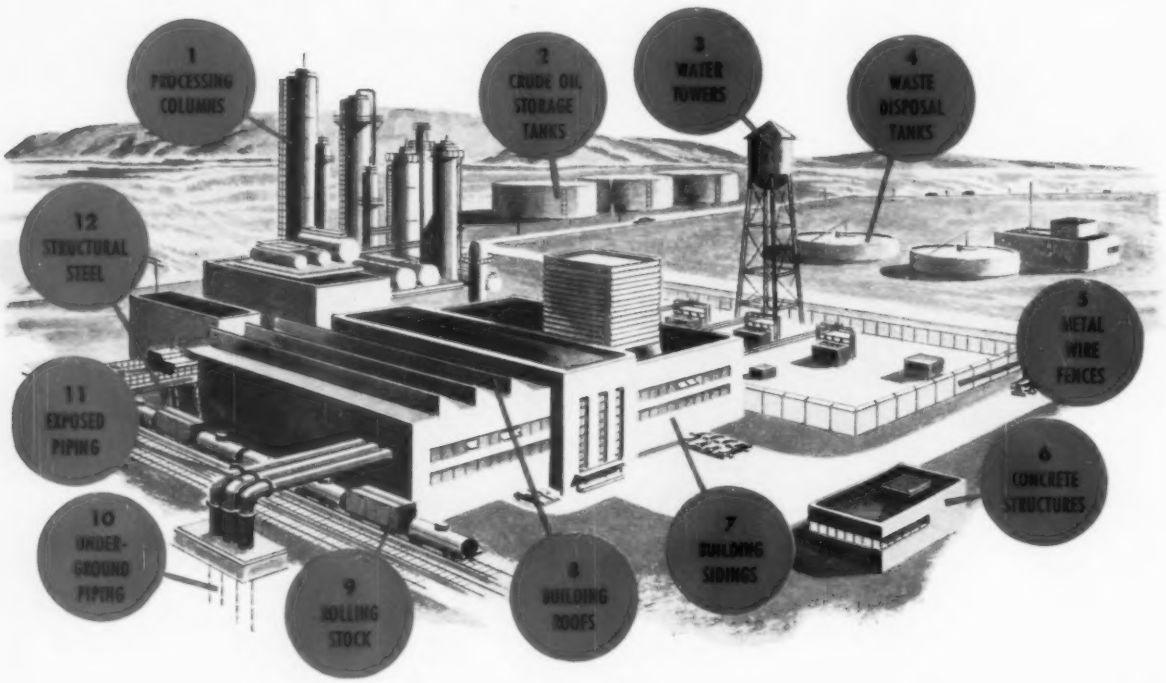


5 Sizes, for ⅛" to 8" Pipe, Conduit or Rod

The Ridge Tool Company • Elyria, Ohio • U. S. A.

For more facts circle 517 on Reply Card

Solve Your Plant's Toughest Corrosion Problems with these PITT CHEM Coatings



1. Processing Columns—For corrosion control alone, use *Insul-Mastic 4010* gilsonite-asphalt vaporseal. For insulation and corrosion protection, use *Insul-Mastic 553* Type D with incorporated cork granules.

2. Crude Oil Storage Tanks—For bottom and top of interiors, use patented PITT CHEM *Tarset* coal tar-epoxy resin coating. For exterior use *Insul-Mastic 4010, 553* or PITT CHEM *101* coal tar coating.

3. Water Towers—For interior, use tasteless, odorless PITT CHEM *104* coal tar coating. For exterior, use *Insul-Mastic 4010.*

4. Waste Disposal Tanks—Use acid and alkali-resisting *Tarset* or tough, heavy-bodied PITT CHEM *101.*

5. Metal Wire Fences—Apply weather-resisting PITT CHEM *102* coal tar coating with roller or brush.

6. Concrete Structures—Use *Insul-Mastic 4010* vaporseal or *Mica-Mastic 5402*, a synthetic resin coating containing white mica, specifically compounded for waterproofing and decorating masonry.

7. Building Sidings—Weatherproof with *Insul-Mastic 4010* and finish with *Insul-Mastic Color Coat.* Available in eight shades, *Color Coat* is specifically designed for use over PITT CHEM coal tar and *Insul-Mastic* coatings.

8. Building Roofs—Use *Insul-Mastic* roofing coatings outside. For condensation control and insulation on underside, use *Insul-Mastic 553.*

9. Rolling Stock—Apply *Insul-Mastic Dednox* coatings for protection of frames, box car ends and roofs of railroad cars.

10. Underground Piping—Use PITT CHEM *Tarset* or PITT CHEM *101* heavy duty coal tar coating.

11. Exposed Piping—Protect with *Tarset or Insul-Mastic 4010* and code with *Insul-Mastic Color Coat.*

12. Structural Steel—Apply economical, weather-sealing *Insul-Mastic 4010.*

THERE'S hardly a corrosion problem around your plant that can't be controlled with a PITT CHEM coal tar or INSUL-MASTIC gilsonite-asphalt coating. From ordinary weatherproofing to stopping tough chemical and underground corrosion, there's a PITT CHEM coating to do the job efficiently and economically.

Pitt Chem Industrial Coatings are available through leading Industrial Distributors. See the "Yellow Pages" of your telephone directory.

PROTECTIVE COATINGS • COAL CHEMICALS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

For more facts circle 518 on Reply Card

BULLETINS just released and of immediate plant interest

STORAGE EQUIPMENT

101 Steel Shelving—Bulletin B-40, 8 pp, describes and illustrates six styles of open and closed types of plain and ledge boltless steel shelving, designed for fast installation. It also covers companion shelving equipment such as drawer case units, counters, tool storage racks and shelving boxes. Line drawings illustrate shelving arrangements. Penco Div., Alan Wood Steel Co.

102 Shelving Advantages—Six reasons why this manufacturer's steel shelving saves money for an industrial plant are presented in Bulletin 282; strength, rapid assembly, flush appearance, others. Both open and closed types are covered, and some of many storage combinations available are illustrated. De Luxe Metal Furniture Co.

103 Steel Cabinets—Bulletin B-50 illustrates and describes eight styles of steel storage cabinets, including double- and single-door storage, wardrobe and combination cabinets; desk- and counter-high cabinets. Complete size data is given. Also shows lockers, shelving. Penco Div., Alan Wood Steel Co.

104 Storage Racks—Twelve-pp Bulletin R-400 illustrates and describes a wide variety of storage racks manufactured by the company. Application drawings, photos and diagrams are included. Chicago Tramrail Corp.

105 Metal Framing System—Illustrated Folder S-5 features many applications of company's all-purpose metal framing system, including electrical and mechanical applications, as well as some of its uses in erecting racks, shelving and partitioning. Sketches of typical fittings and descriptions of channel units are included. Unistrut Products Co.

MATERIALS HANDLING

106 Pallet Handling—Labor saving advantages of unit load handling and pallet handling in narrow aisles are discussed in this 24-pp bulletin. Principal types of trucks available for narrow aisle operations are described and typical applications are illustrated. The Raymond Corp.

107 For Modern Warehousing—Circular 35K, 6 pp, describes a narrow-asile rider-type electric tiering truck with 24-v electrical system. Contains operating and maintenance details on the truck, available in capacities of 2000 or 3000 lb. It is designed to provide maneuverability, fast lifts and powerful traction, and for high stocking work. Lewis-Shepard Products, Inc.

108 Conveyor System—The Flexveyor, an individually engineered conveyor system for material handling through assembly-finish-trim and packing operations is described in this 6-pp bulletin. Brief text covers versatility, flexibility, maintenance and other advantages of system. Automation Equipment Co.

109 Pneumatic Conveying—Sixteen-pp Bulletin M-588 shows how pneumatic conveying systems can reduce plant operating costs and improve efficiency. Covers high density (fluidizing type) and low density conveying systems and equipment. Common installation arrangements are diagrammed. Photos show installations, basic equipment and accessories. The Day Co.

110 Conveyors, Systems—Unibilt conveyors, featuring standardized unit design, are discussed as to economy, ease of erection and alteration, other benefits, in 6-pp Bulletin CL858. Illustrations show available types of horizontal belt conveyors, inclined belt conveyors and live roll and gravity conveyors. Conveyor Specialty Co., Inc.

111 For Parts Feeding—Form 3R3384 is an 8-pp brochure on automatic parts feeders, including non-mar feeder-orientors for handling fragile and highly finished parts; elevating oriented feed hoppers, stack feeders, and rotary hoppers. Also shown are automatic high speed hardness testers, grinder controls, others. Radio Corp. of America.

112 Industrial Trackwork—This 8-pp bulletin describes trackwork designed for mills and other industries which maintain in-plant rail trackage. The booklet illustrates and lists specifications for turnouts, frogs, guard rails, switch stands, crossing, etc. Includes ordering tips. American Brake Shoe Co.

INSULATION

114 Block Insulation—This 8-pp brochure contains detailed information on advantages of Abosite—a durable, lightweight, block type insulating material composed of asbestos fibers bonded with an inorganic silicate binder. Recommended specifications for vessel insulation are included. The Aber Co., Inc.

115 Insulation for Cold Spots—Twelve-pp Booklet FL-104 covers use of Foamglas insulation in low temperature areas. Contains photos and brief descriptions of new and unusal types of cold storage enclosures made possible by the physical characteristics of this cellular glass insulation. Pittsburgh Corning Corp.

116 Glass Fiber Insulation—Eight-pp Form WPD-13, illustrates various glass fiber insulations, covering description, features, uses, installation, thermal and acoustical performance, standard items and types of facings available. Also included are sections on quartz microfibers for high temperature insulation, advantages and uses of glass papers, plus rovings, textile yarns and mat products. L. O. F. Glass Fibers Co.

CONSTRUCTION

117 Steel Buildings—This 16-pp illustrated booklet discusses company's building method, describes four types of buildings and three types of steel covering materials. Accessories are detailed, specifications given, interior finishes described, and typical uses shown covering a wide range of building requirements. Armco Drainage & Metal Products, Inc.

118 Watertight Concrete—A summary of information on design and specification of watertight concrete is given in this 6-pp folder. Covers basic requirements for watertight concrete and shows how Pozzolith reduces permeability, shrinkage, bleeding and segregation to produce strong, durable structural concrete, resistant to penetration of water under normal conditions. The Master Builders Co.

119 Modern Skylights—Marcolite aluminum and fiber glass skylight products are featured in this 12-pp bulletin. Design and construction features are detailed and illustrated with photos and cutaway diagrams. Dimensional data and specifications are included. The Marco Co.

120 Plastic Flashing—Advantages, physical data and specifications of Saraloy 400, an elastic plastic flashing, are provided in Form 153-87. Saraloy 400 is used for fasciae, vent stacks, roof drains, pipe entries, corrugated panels, ventilator bases, expansion joints, base flashing, other flashing applications. The Dow Chemical Co.

121 Flooring Products—Illustrated in color, this 12-pp catalog displays the full line of this company's flooring products. Provides product descriptions, tells where to install and includes brief specifications on Azrock vinylized tile, Azphlex vinylized tile, Vina-Lux vinyl asbestos tile, and Duraco vinyl industrial tile. Azrock Floor Products Div., Uvalde Rock Asphalt Co.

122 Anchor Plates—For plant engineers with a heavy-duty flooring problem, this handy bulletin describes company's anchor steel plates designed to provide durable, economical protection for industrial floors, reduce maintenance, and provide greater safety. Photos illustrate typical installations. Stelcon Industrial Floors, Inc.

On pages 161-162 are two postage-free Reader Service Cards provided for your convenience in ordering these bulletins. You may also use the cards to order any literature mentioned in ads.

123 Socket Screw Products—Catalog 23, 28 pp, on socket screw products, features Setko socket shoulder screws, flat heads, button heads and dowel pins. Also shown is the expanded line of Setko Perfect-Hole cold forged socket head cap screws. Included in catalog is a selector chart for self-locking set screws. Over 1001 combinations of metals, locking actions, points and suggested applications make this chart a practical aid in ordering of screw products. Set Screw & Mfg. Co.

BULLETINS

(Begins on page 23)

LIGHTING, COMMUNICATION

124 Lighting Fixtures—Contractor Price List No. 6 is a 50-pp pictorial catalog, indexed for easy reference, to company's expanded line of lighting fixtures and electrical accessories. A section is devoted to a complete line of luminous ceiling systems. Leadlight Fixture Co.

125 Industrial TV—Design and applications of company's industrial television equipment are detailed in this 8-pp brochure. Advantages of industrial television are discussed, typical applications illustrated, and dimensional data and specifications given. Philco Corp.

ELECTRICAL

127 Weather-Protected Motor—Six-pp Bulletin 2550 features horizontal weather protected motors for outdoor operation in extreme weather, for use in such industries as chemical, petroleum, paper processing, public utility and for applications in pipeline, boiler feed pump and other outdoor installations. Cutaway drawings showing features are included. The Louis Allis Co.

128 Distribution Center—Condensed information on company's expanded line of Tranfo Units—pre-engineered packaged load distribution centers—is supplied in Bulletin 12004-A. In addition to summing up ranges and equipment available in the line, bulletin also discusses advantages of this type of unit in terms of safety, service, flexibility, efficiency and ease of installation. I-T-E Circuit Breaker Co.

129 Lighter Transformers—Bulletin GEA-6790, 8 pp, describes lighter weight, aluminum wound sealed dry-type transformers rated 300 kva and above. As much as 2000 lb lighter than many sealed dry units, these transformers can be installed on balconies, catwalks, or other overhead platforms. Bulletin covers key standard and optional features, design variations, photos, charts. General Electric Co.

130 Trolley Busway—Bulletin 60 contains 40 pp of information on company's 60-amp steel-enclosed trolley busway electrification system, as well as a 20-amp trolley, an enlarged line of standardized curved track sections and other items. Illustrates and describes the track, trolleys and accessories used in electrification of light tonnage cranes and hoists, assembly and production lines, moving test lines, portable machine tools, lighting. Feedrail Corp.

131 Control Center—Bulletin 2-2000A outlines features and specifications of company's control centers. Covers two major components of the centers—structural sections and electrical control units. General features, construction, parts, and dimensions are described for each, and specifications included. Federal Pacific Electric Co.

132 Control Centers—Bulletin PAN-10-58 describes Pushmatic Electri-Centers with pushbutton convenience. Circuit diagrams and box size and knockout diagrams are included. Bulldog Electric Products Co., Div. I-T-E Circuit Breaker Co.

133 Reduced Voltage Starters—Design and construction features of company's automatic reduced voltage starters are described in 12-pp Bulletin 14 B 8192. In addition, starting characteristic calculations, horsepower ratings, features of the contactors, relays, etc. are covered. Allis-Chalmers Mfg. Co.

134 Portable Distribution System—Described in this 30-pp catalog is a portable distribution system for electric lighting and power, including such applications as portable lighting, heating and ventilation equipment, welding machines, power tools, and lighting transformers. System diagrams showing how each unit fits, and where it is located in the catalog are included. Whitney Blake Co.

135 Flexible Cords—Bulletin 1108, 64 pp, combines technical information and a catalog of flexible cords and portable cables. Dealing completely with company's mold cured Okoprene sheathed cords and cables, the book's main divisions give dimensional data, engineering information, and splicing instructions. The Okonite Co.

FANS

136 Propeller Fans—Bulletin FM-2345 is a 24-pp pictorial record of heavy-duty propeller fans and related package units. Presents power roof ventilators; jacket water coolers; heat pump installations, dual service condenser and evaporator packages; units for kiln circulation; units for special services. Text accompanying installation photos includes information on construction features, suggested applications. Buffalo Forge Co.

137 Ventura Fans—Bulletin 8914 describes ventura fans for high and low pressures. Tables give fan speed, motor horsepower, quietness ratings, and net weight as well as delivery over a range of static pressure values. Also included is chart explaining significance of quietness ratings, and installation type drawings and dimensional data. American Blower Div., American-Standard.

PUMPS, COMPRESSORS

139 Screw Pumps—Six-pp Bulletin SI-6 outlines construction, operating characteristics, dimensions and capacities of internal gear and bearing screw pumps. Includes standard horizontal, vertical submerged sump type, vertical dry type hopper, and steam jacketed types, in capacities from 1 to 2000 gpm, discharging up to 1000 psi, for fluids and semi-fluids in many viscosities. Sier-Bath Gear & Pump Co.

140 Low Pressure Compressors—Eight-pp Bulletin A-95 covers heavy-duty, low-pressure compressors. Provides specifications on three models from 756 to 7392 cfm and includes detailed sectional drawing. There is also a run-down, with illustrations, on vital parts and features. Joy Mfg. Co.

141 Centrifugal Compressors—Twenty-pp Bulletin 909 describes construction and operating features of centrifugal compressors and lists some typical applications. Ratings based on ASME Test Code are tabulated for typical pressure-volume-horsepower selections in the range of pressures and volumes most frequently encountered. Possible arrangements are illustrated and line drawing shows positions in which compressor discharge can be located. American Blower Div., American-Standard.

142 Centrifugal Compressors—Bulletin 165 describes single stage centrifugal compressors for petrochemical and refinery applications. Details are given on casings, bearings, seals, impellers, lubrication system, baseplates and couplings, plus recommended applications. Clark Bros. Co.

HEATING

143 Electric Heating—Twelve-pp Booklet F-1615 illustrates most heating problems encountered in industrial plants and shows an electric heating equipment solution for each one. Illustrates electric baseboards, unit ventilators, recessed wall units, ceiling-mounted and wall type unit heaters, portables, duct heaters and radiant heaters for difficult "spot heating" applications. Edwin L. Wiegand Co.

144 Heating Coils—Bulletin 890, 30 pp, contains coil selection information as well as descriptive information on the coils themselves. Included, are construction specifications, dimensional data, surface charts, circuiting and piping diagrams, etc. Temperature rise charts are given in the steam coil section of the bulletin, as well as face velocity charts, altitude and temperature correction charts, steam-pressure-and-temperature correction-factor chart. American Air Filter Co., Inc.

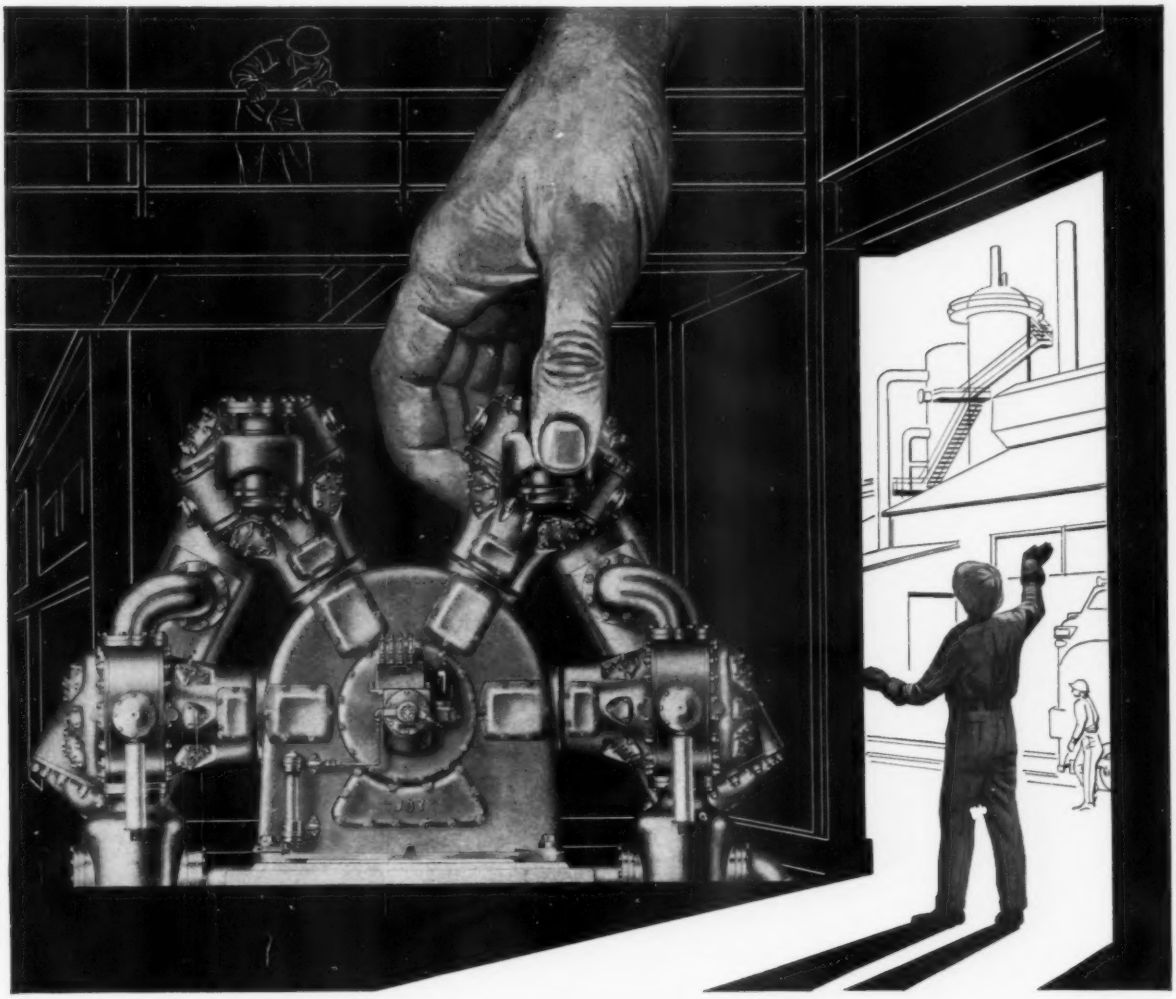
Postage-free Reader Service Cards make it easy to order bulletins. Cards are provided on pages 161-162.

145 Water Heaters—Bulletin J-1, 8 pp, includes concise data on instantaneous heater, booster and converter units. Includes descriptions, model numbers, capacities, pressures, ratings, dimensions, weights, and list prices. The Sims Co., Inc.

146 Portable Space Heaters—Catalog 5815, on portable space heaters, give specifications on nine models, including those with built-in thermostats. Also provides selection information. Stow Mfg. Co.

147 For Cold Cargo—This 20-pp booklet, Bulletin 168, describes infrared heating equipment for thawing frozen coal and other bulk material in railroad cars. Presents a technical description of infrafed heat rays and explains how they can be harnessed to speed up the unloading of materials in freezing weather. Hewitt-Robins, Inc.

(More Bulletins on page 163)



SET A 500 TO 1000 HP AIR COMPRESSOR IN THE CORNER OF YOUR PLANT . . . *almost as easy as this*

IF YOUR EXPANDING PLANT FACILITIES are requiring more compressed air . . . *and* putting a squeeze on plant space, here's the answer . . . the *new* Joy WN-224 compressor. Because of its compact semi-radial design, the WN-224 is delivered as a package—completely assembled—ready to go. Just bolt it down, connect power, water, and air lines . . . and you're ready for long, continuous service. This is the only true "package" compressor available in these capacities . . . 2418 to 6048 cfm . . . horsepower ratings from 350 to 1000.

AND THE WN-224 SOLVES YOUR SPACE PROBLEMS . . . it can be installed where no other compressor of equal capacity will fit. Instead of long, horizontal units on massive foundations, the Joy WN-224 has four cylinders arranged semi-radially around the frame. This compact, balanced arrangement assures smoother running, gives longer service with far less maintenance. Get the whole story on the WN-224 from ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

WBW 1 6666-179

Write for FREE Bulletin 179-15

JOY . . . EQUIPMENT FOR INDUSTRIAL PLANTS . . . FOR ALL INDUSTRY

Industrial Compressors

Conveyors

Electrical Connectors

Fans and Blowers

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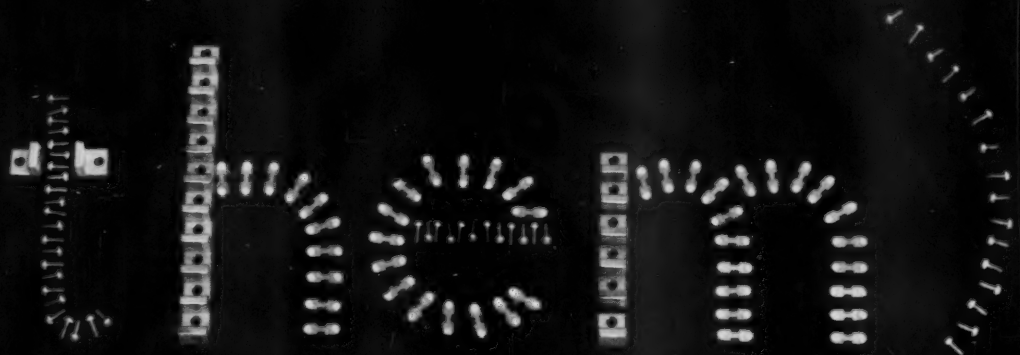
COMING

Here are 244 overhead crane control parts that you'll never have to buy, inventory, or replace if you have P&H electronic "stepless" crane control!



These are wearing parts from the switch gear in an AC overhead crane. They are the most frequently replaced parts on most overhead cranes. Besides their original cost, they are a source of downtime, production delay, and maintenance labor costs.

These parts have been eliminated from P&H's new Electronic "Stepless" Control and replaced with a wiring circuit requiring no maintenance.

Interested? Write Dept. 130C, Harnischfeger Corp., Milwaukee 46, Wisconsin.

P&H **HARNISCHFEGER**
... quality and service for 74 years

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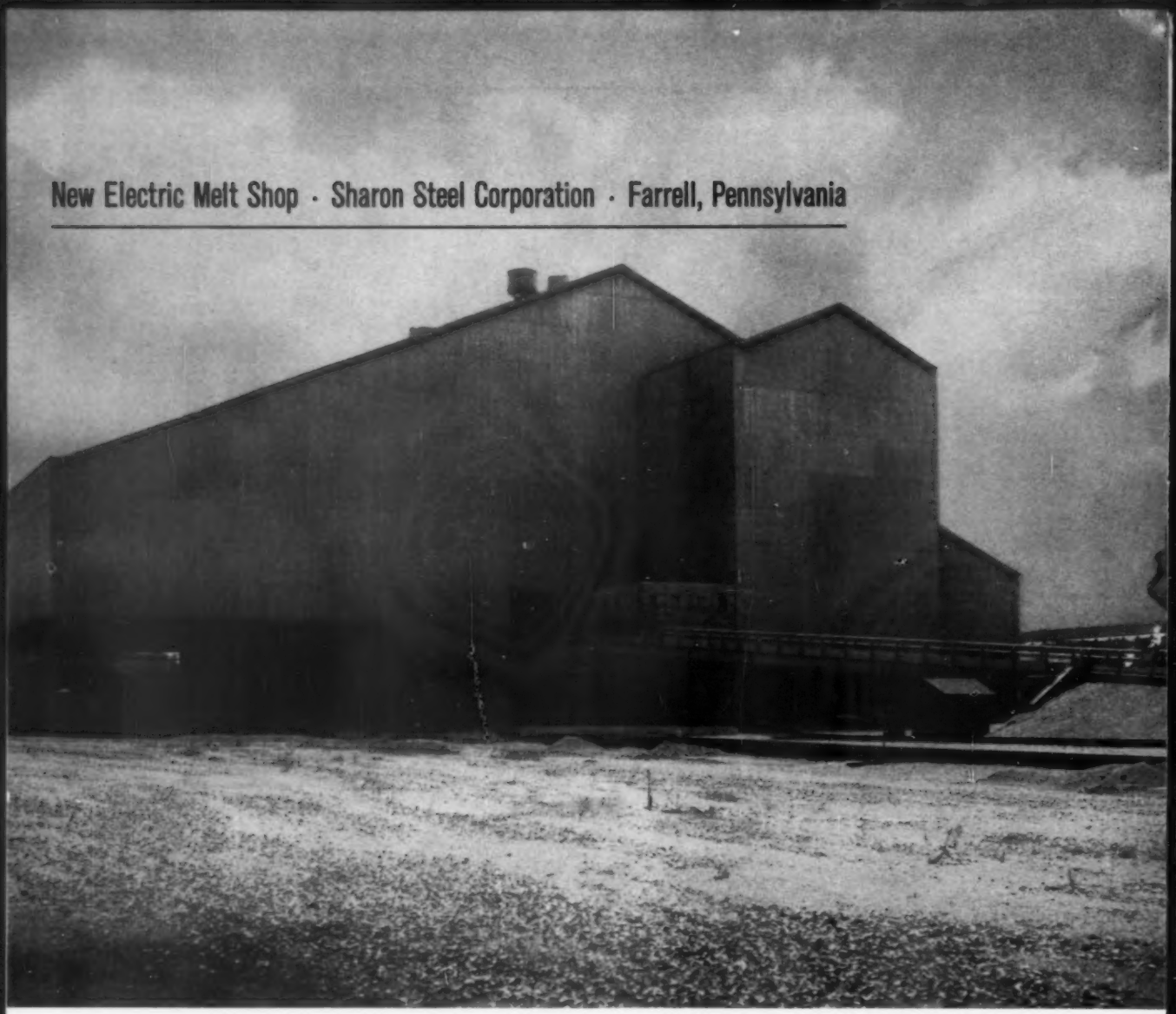

New Electric Melt Shop · Sharon Steel Corporation · Farrell, Pennsylvania

FROM FOUNDATION TO

American Bridge
Division of
United States Steel

FURNACE—an American Bridge job!

Sharon Steel's new electric melt shop at its Roemer Works in Farrell, Pennsylvania was built and delivered ready for operation by American Bridge.

American Bridge handled the entire job—from engineering . . . to foundations . . . to fabrication and erection of the building itself . . . to the installation of overhead cranes, utilities and all other operating equipment, including the 100-ton Heroult Electric Furnace.

The building is 277′ wide x 250′ long x 64′ to top of crane rails. It includes an 86′6″ x 200′ charging aisle, a 66′6″ x 250′ pouring aisle, an 87′8″ x 200′ scrap yard aisle, a 36′6″ x 175′ hot-top lean-to plus a 50′ x 50′ office and locker room. American Bridge also furnished and erected 3,300 sq. ft. of concrete-filled USS AmBridge I-Beam-Lok for truck ramp to charging floor.

This is the second big job we have done for Sharon Steel, having designed and built their new blooming mill building in 1956.

Whether you need complete new facilities, or only want to expand or modernize, discuss your plans with American Bridge. Our vast experience can help you reduce cost, time and trouble.

USS, AmBridge and I-Beam-Lok are registered trademarks

General Offices: 525 William Penn Place, Pittsburgh, Pa. Contracting Offices in: Ambridge • Atlanta • Baltimore • Birmingham • Boston • Chicago • Cincinnati Cleveland • Dallas • Denver • Detroit • Elmira • Gary • Houston • Los Angeles • Memphis • Minneapolis • New York • Orange, Texas • Philadelphia Pittsburgh • Portland, Ore. • Roanoke • St. Louis • San Francisco • Trenton • United States Steel Export Company, New York

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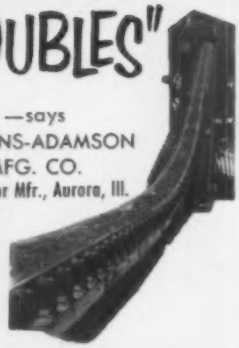
"NO MORE LUBRICATION TROUBLES"

—says STEPHENS-ADAMSON MFG. CO.
Conveyor Mfr., Aurora, Ill.

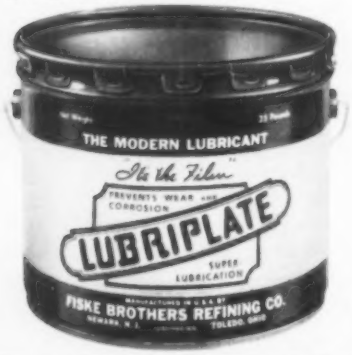


"LUBRIPLATE Lubricants satisfy the 'one-shot' requirements of our conveyor idlers. LUBRIPLATE effectively lubricates each bearing in turn and flows through the hollow shaft to the next bearing. We do not know of a single case of bearing trouble through faulty lubrication where LUBRIPLATE has been used."

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE GREASE AND FLUID TYPE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE COSTS.

LUBRIPLATE is available in grease and fluid densities for every purpose . . . LUBRIPLATE H. D. S. MOTOR OIL meets today's exacting requirements for gasoline and diesel engines.

For nearest LUBRIPLATE distributor see Classified Telephone Directory. Send for free "LUBRIPLATE DATA BOOK" . . . a valuable treatise on lubrication. Write LUBRIPLATE DIVISION, Fiske Brothers Refining Co., Newark 5, N. J. or Toledo 5, Ohio.



For more facts circle 522 on Reply Card

BACKTALK AND FORETHOUGHTS

Edited by Marjorie E. Weissman

Northern Maintenance

PLANT ENGINEERING:

"Many thanks for sending along the first section from your September, 1958 issue, of your writings on the Alaskan Air Command maintenance program. Your article is written in a very effective manner, and I feel that you have done the Command, as well as the U.S. Air Force, a real service in telling our story to the industrial world.

"For the commander of Alaskan Air Command and myself, I would like to express sincere appreciation for your contribution.

"We are anxiously awaiting the next issue of PLANT ENGINEERING." *Donald F. Lehnhard, Colonel, USAF, DCS/Installations, Headquarters, Alaskan Air Command.*

PLANT ENGINEERING:

"We noticed with a great deal of interest your article in the September issue of PLANT ENGINEERING on 'Preventive Maintenance — Alaska Style,' since it mentioned the fact that at Murphy Dome Air Force Station, mineral insulated, copper-sheathed heating cable was used inside an insulated, 8000-ft water line.

"We were the suppliers of the heater cable units used, and would be quite interested in having any other information you might have but which did not appear in the article. We are also quite interested in any pictures which might be available for this installation.

"If you have such pictures or additional information, we will be most grateful." *C. A. Saville, Nelson Electric Manufacturing Co., Tulsa, Okla.*

► These two articles written by Associate Editor Marjorie Weissman, on the problems of maintaining Air Force installations in Alaska, appeared in our September and October, 1958 issues. We have forwarded Mr. Saville's request to the Maintenance Directorate of the Alaskan Air Command.—*Editors.*

Just Some of the 600 Requests

"In reference to your current series of articles relative to construction specifications and as suggested in your September, 1958 issue, I would like to request the 16-page copy of section A, 'General Conditions' and the other reproductions." *E. M. Prouty, Facilities Planner, CBS Television City, Los Angeles, Calif.*

PLANT ENGINEERING:

"We would like very much to have two copies for our files of parts I, II, III, IV and V of section A, 'General Conditions' and full size reproductions of the bulletins shown in Figures 1, 2, 3 and 4, as offered in your September issue, page 112." *W. R. Gillam, Plant Engineer, The Babcock and Wilcox Company, Boiler Div., Barberton, Ohio.*

PLANT ENGINEERING:

"I would very much appreciate receiving a copy of section A, 'General Conditions' and a copy of each bulletin shown in Figures 1, 2, 3 and 4 of the article 'Construction Specifications, Part II' which appears in the September issue of PLANT ENGINEERING.

"For a number of years, I have found articles appearing in your magazine most informative. I especially appreciate the opportunity of getting tear sheets to add to my files." *John Morton Crewz, P. E., E. I. du Pont de Nemours & Co., Camden, S. C.*

Treating Cooling Tower Water

► The following letter was sent by a reader to Bert H. Griesbach, author of an article in the October, 1958 issue of PLANT ENGINEERING. Below it, we print Mr. Griesbach's reply.—*Editors.*

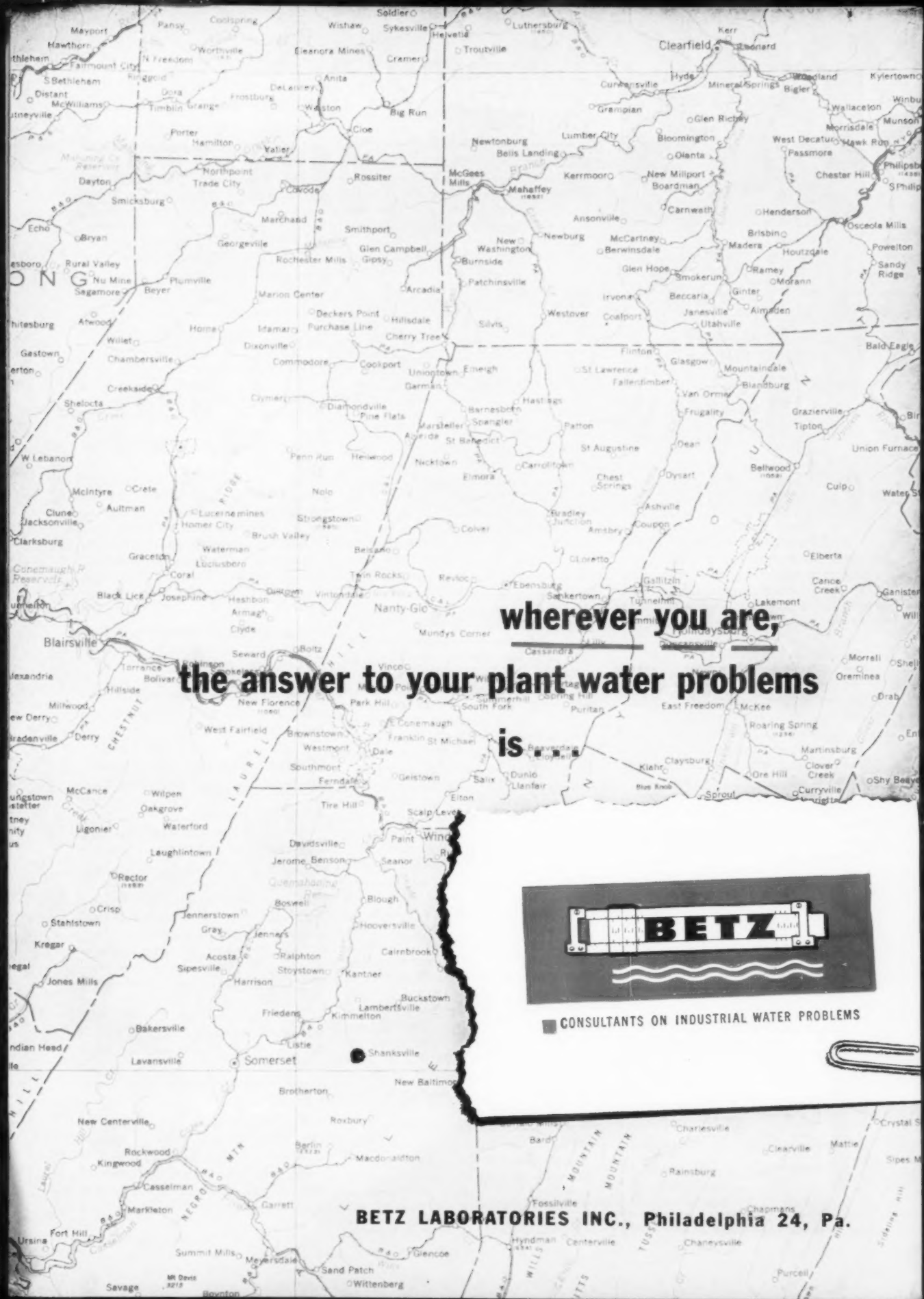
"I have just read your interesting article on cooling towers in the October issue of PLANT ENGINEERING. The article was very well written and we enjoyed reading it very much.

"In this article you mentioned that you treat your cooling tower water every third day and try to maintain a pH at about 6.0. Providing you have the time, we would appreciate having details of this water treatment."

Mr. Griesbach's reply follows:

"Over the past 10 years we have used a number of different cooling water treatments and have found several products manufactured by Oakite Products Inc., have given us the most satisfactory results.

"Our plant air conditioning sys-


wherever you are,
the answer to your plant water problems
is . . .
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CONSULTANTS ON INDUSTRIAL WATER PROBLEMS
BETZ LABORATORIES INC., Philadelphia 24, Pa.

pole-type INDUSTRIAL buildings

Go Up Fast...

In days . . . not months . . . you can have the new building you need. Sound engineering plus simplicity of design minimize erection time; and because there are no foundations to lay, no tedious pre-fabrication to slow the job, construction is quick and easy. Thus emergency needs can be speedily met, eliminating the time consuming "no-profit" building period required by conventional building methods.

The structure shown is 60 feet x 135 feet. It was erected by 7 men in 8 weeks at a cost of approximately $20,000.

Figure the speed with which you can get the shelter you need . . . the low, low cost of pole-type construction . . . then, for full particulars, mail the coupon—today!

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☐ Send full particulars on Pole-Type Industrial Buildings.

☐ Have a Koppers Qualified Contractor contact us.

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BACKTALK— FORETHOUGHTS

tem is accomplished by circulating chilled water and working in conjunction with these units are our humidifying units located in various parts of the plant.

"Basic water treatment is Oakite No. 55M which comes in powdered form and is best pre-mixed with water to assure the material being properly dispersed. This solution is added to the top cooling trays of our towers in a manual operation.

"This solution contains chromates and lime suppressors as well as inhibitors to provide corrosion resistance on all metal surfaces. It is satisfactory to use in humidifying units in manufacturing areas as it has little or no odor. The concentration of water treatment is checked daily in our towers and three times a day in plant humidifying units.

"Our method of checking the water treatment concentration is by titrating or bleaching. We have found that a concentration of 1 lb of chemical compound to every 250 gal of water circulated, gives us the best results. The pH of the water will then be maintained between 6.0 and 7.0, and the build-up of algae is held to a minimum.

"Algae in time, will build up an immunity to most water treatment. When this occurs, we use shock treatment. For this, our preference is Oakite Sanitizer No. 1, rather than copper sulphate, since the addition of copper sulphate to the cooling water will lengthen the bleaching time for the Oakite 55 M.

"Cleaning our air conditioning towers and humidifying units is accomplished by circulating a highly alkaline cleaner through the systems, then draining and flushing all the foreign material from the towers and piping. We use either Oakite No. 22 or 62. Our preference normally is for the latter because it has less tendency to foam. The former also has an objectionable odor which is stronger than that of No. 62 and normally prohibits us from using it in the humidifying units supplying our manufacturing areas."

Decals Identify Lubrication

PLANT ENGINEERING:

"It is requested that permission be granted for the Navy to reproduce in its entirety an article that appeared in the September issue of PLANT ENGINEERING magazine entitled, 'Coded Lubrication System for Good Control, Minimum Supervision.'

"If approval is granted, the article will be reproduced and distributed to Eleventh Naval District public works department since it is believed that the article will be beneficial to the Navy's Shore Establishment." *H. O. Bishop, Director, Maintenance Div., District Public Works Office, Eleventh Naval District, San Diego, Calif.*

► We are pleased to hear the article will be of value. You have our permission to reprint the article.—*Editors.*

PLANT ENGINEERING:

"I would very much like to have several tear sheets of my article entitled 'Coded Lubrication System' which appeared in the September 1958 issue of PLANT ENGINEERING magazine.

"So far I have had one inquiry from a firm in Ohio which requested additional information about the decals which we have used, and favorable comments from several lubrication engineers associated with the oil industry." *R. C. Garretson, Lubrication Engineer, Westinghouse Electric Corp., East Pittsburgh, Pa.*

► A great deal of interest has been shown in Mr. Garretson's description of the lubrication system employing decalcomanias for identification, used by his company. We are pleased to send him additional tear sheets.—*Editors.*

Ultrasonic Cleaning For Heat Exchanger Tubes?

PLANT ENGINEERING:

"We are interested in the possible application of the ultrasonic principle for cleaning of exchanger tube bundles. It is felt that the use of high frequency sound vibration might be used to remove a moderate coating of foreign matter and corrosive scale from the outer surfaces of exchanger tubes used in exchangers, coolers, or condensers of an oil refinery.

"Do you know of anyone who manufactures such equipment? If so, we would be pleased to have their name and address." *F. D. Davis, Superintendent, The Texas Co., Lockport, Ill.*

► The biggest problem here would seem to be the size of the equipment involved, but we are sending this reader the names and addresses of several manufacturers of ultrasonic cleaners.—*Editors.*

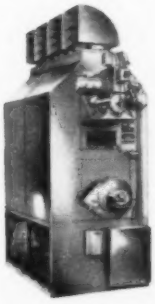
LENNOX INDUSTRIAL HEATERS

...DEVELOPED ...TESTED

in the finest Lennox tradition of superior engineering

From the Lennox Product Development Laboratories come the most thoroughly tested industrial heaters on the market. Modern methods of heat transfer and combustion testing develop heaters adaptable to any application—for heating alone, heating-cooling, ventilating or make-up air requirements. All of this is a part of the continuing Lennox program of technical research.

Specify "Lennox or approved equal" and you'll be sure of the best engineered, highest quality equipment in the heating and ventilating field. Send today, for your complete file of Lennox Industrial Heater specifications and data.



"AT" SERIES HEATERS
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Oil, gas or combination fuel

GAS DUCT HEATERS
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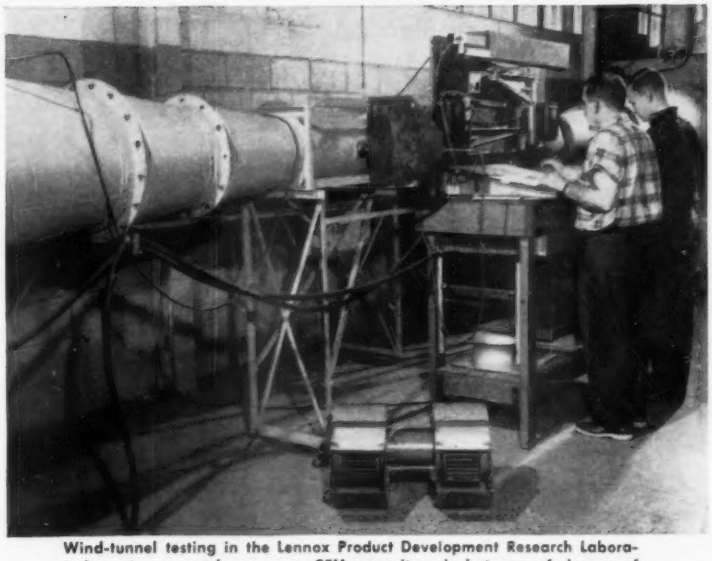
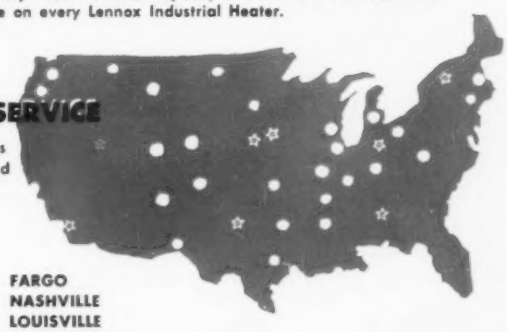
Economical, compact, rugged



Wind-tunnel testing in the Lennox Product Development Research Laboratories — to accurately measure CFM capacity — is but one of dozens of factory tests made on every Lennox Industrial Heater.

ON THE SPOT SERVICE

Cities where Lennox sales representatives are located



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*Indicates cities where Lennox plants are located.

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Please send me — without obligation — complete specifications and engineering data on Lennox Industrial heaters.

Name_____

Company_____

Address_____ City_____

Title_____

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as at Lever Brothers begins with a

LEVER BROTHERS COMPANY
LOS ANGELES

Here's the expected performance of seven OTIS Freight Elevators at the LEVER BROTHERS COMPANY plant at Los Angeles. Five 10,000 pound duty cars are constantly carrying raw material up from the ground floor for gravity processing. One of these cars and a 4,000 pound duty car are used for warehousing finished products. Another 2,500 pound duty car handles material for the laboratory and doubles as a passenger car to the cafeteria.

OTIS Maintenance—through the local OTIS office—assures trouble-free elevator service at LEVER BROTHERS.

Trouble-free freight elevator service starts with a FREE Otis Maintenance Survey and Estimate. Our approach is illustrated at the right.

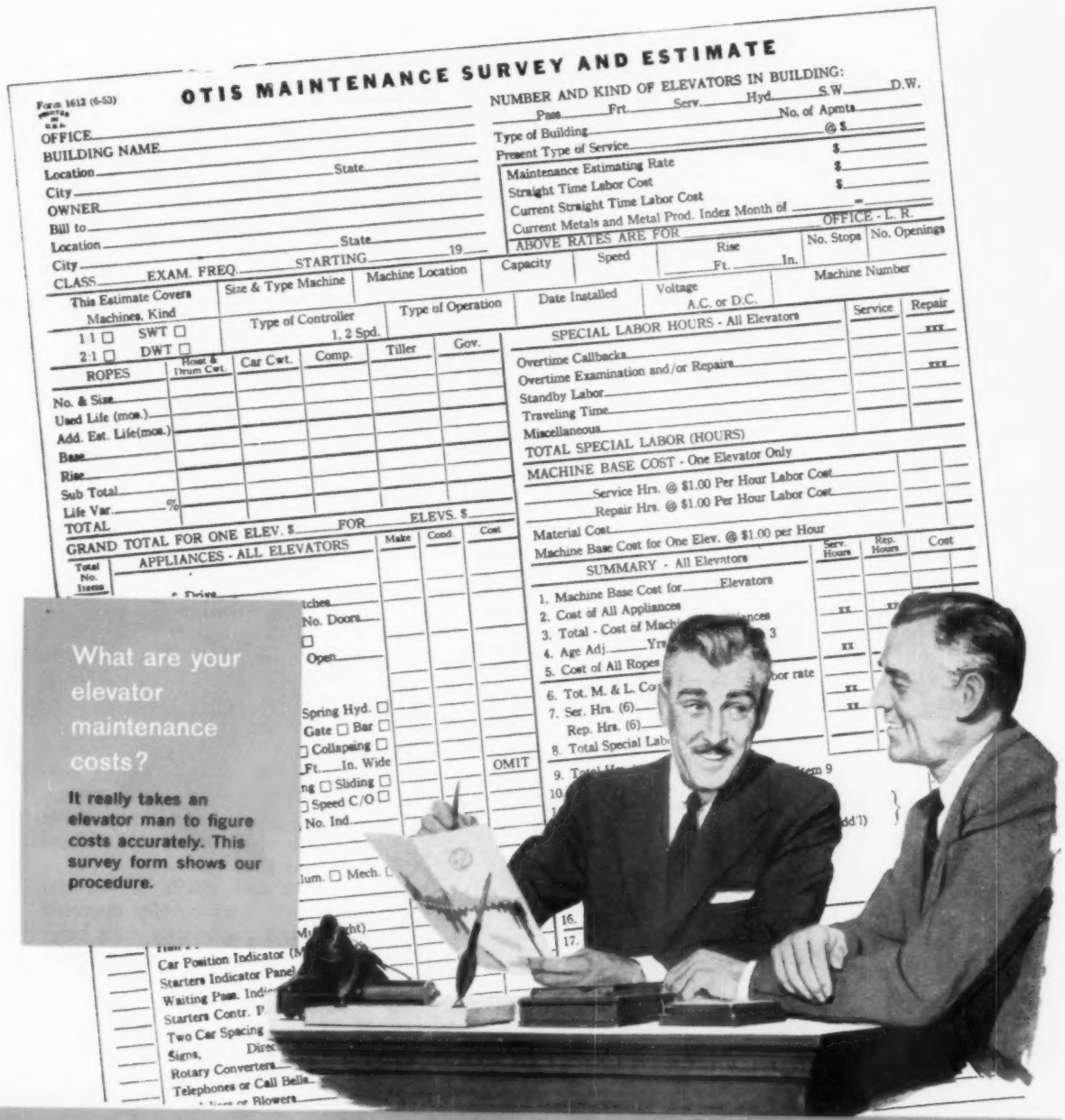
In addition to freedom from shutdown costs, you'll be freed of unexpected, expensive repair bills. There's just one fixed monthly charge. It can be budgeted. It's adjusted annually, up or down, on labor and material costs only. And never because of the age or condition of the equipment.

Otis **freight elevator**

"ENGINEERED SERVICE BY THE MAKER"

OTIS ELEVATOR COMPANY • 260 ELEVENTH AVENUE • NEW YORK 1, N.Y.

trouble-free elevator service
FREE OTIS maintenance SURVEY



maintenance "that keeps freight elevators running like new"

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PLANT ENGINEERS' DIGEST —so those who rush may read and know what's new

Edited by Marjorie E. Weissman

Photographs as Trouble Shooters

A SCIENTIFIC photographic method is now used at the Westinghouse Electric Corporation's electronic tube division, Elmira, N. Y., in quality control of tube parts surfaces.

Panchromatic emulsions, when used in conjunction with lighting of blue, orange, red, yellow, magenta, green, and white light, are peculiarily sensitive to variation in surface absorption and consequent reflection of a particular spectrum band, depending on the character of the affected areas.

For example, an acid stain on a clean metallic surface such as a bichromate or chromic acid stain, when washed, may be hardly detectable by the eye of an experienced inspector even under rigid lighting control. The stained areas of the same surface, if photographed with a suitable film emulsion through a blue or magenta filter, will show up as a light-colored area on the negative.

Engineer checks photographic equipment before making tube quality test.

The use of photography has recently been applied to tighten process control in the camera tube department at Westinghouse. Certain parts in which surface contamination may be most critical are photographed after various processing steps. Comparison of these photographs, made with a fine grain panchromatic film plus a blue filter, has been of great assistance in locating obscure sources of contamination, resulting in a higher uniformity in this critical product. *From a release of Westinghouse Electric Corp., Pittsburgh, Pa.*

"Snake Pit" Comes to a Paint Plant

Maze of flexible hose lines is used for transferring varnish and processed liquids from fourth floor "tank farm" to points of use at new Sherwin-Williams plant located in Garland, Tex. (From a release of Turnbull, Inc., Cleveland, Ohio.)

Maintaining Overhead Rolling Doors

ALTHOUGH OVERHEAD rolling doors are designed to provide trouble-free service, they should be checked at least every six months. It is recommended that the following points be checked:

1. Check door curtain travel for proper side clearance in the guide. If guides are mounted plumb, this will indicate if the roller shaft has shifted. Check curtain slats for broken endlocks and windlocks.
2. Check and tighten, if necessary, motor operator mounting, bracket and guide bolts.
3. Check balance of door curtain, reset counterbalance spring.
4. Clean and lubricate guide channels with a thin coat of hard graphite grease.
5. Oil stub shafts of exposed gears on mechanically-operated doors, and the driving shaft bearings. Exposed gears should be cleaned and greased lightly.
6. Lubricate roller chains on sprocket drives and limit switch drives of power operators.
7. Operate and reset at least once a year, Underwriters' labeled rolling steel fire doors. Check operation of automatic release device and closing mechanism.

When making adjustments, do not attempt to change torque-tension on the counterbalancing spring unless proper tools are on hand. Two round rods at least 30 in. long and of a diameter to fit the spaced holes in the adjusting wheel are required.

(Continued on page 44)

For more facts circle 527 on Reply Card →

An Electrical Engineer comes to CROUSE-HINDS for the "Latest Dope" on Explosion-Proof Electrical Equipment

"Charlie," says the visiting engineer, "I'm looking for the latest and best in explosion-proof electrical equipment for our new petrochemical plant.

"We'll have a variety of hazards that will hit every Group under Class I of the National Electrical Code.

"I'm here to find out what you've got that meets our specifications."

"Well sir," says Charlie, "before we get into specs, I'd like to go to fundamentals for a minute.

"You don't need to be told that physical laws are unbreakable. Try to break them . . . and they break us. Just *flirt* with them and we get slapped.

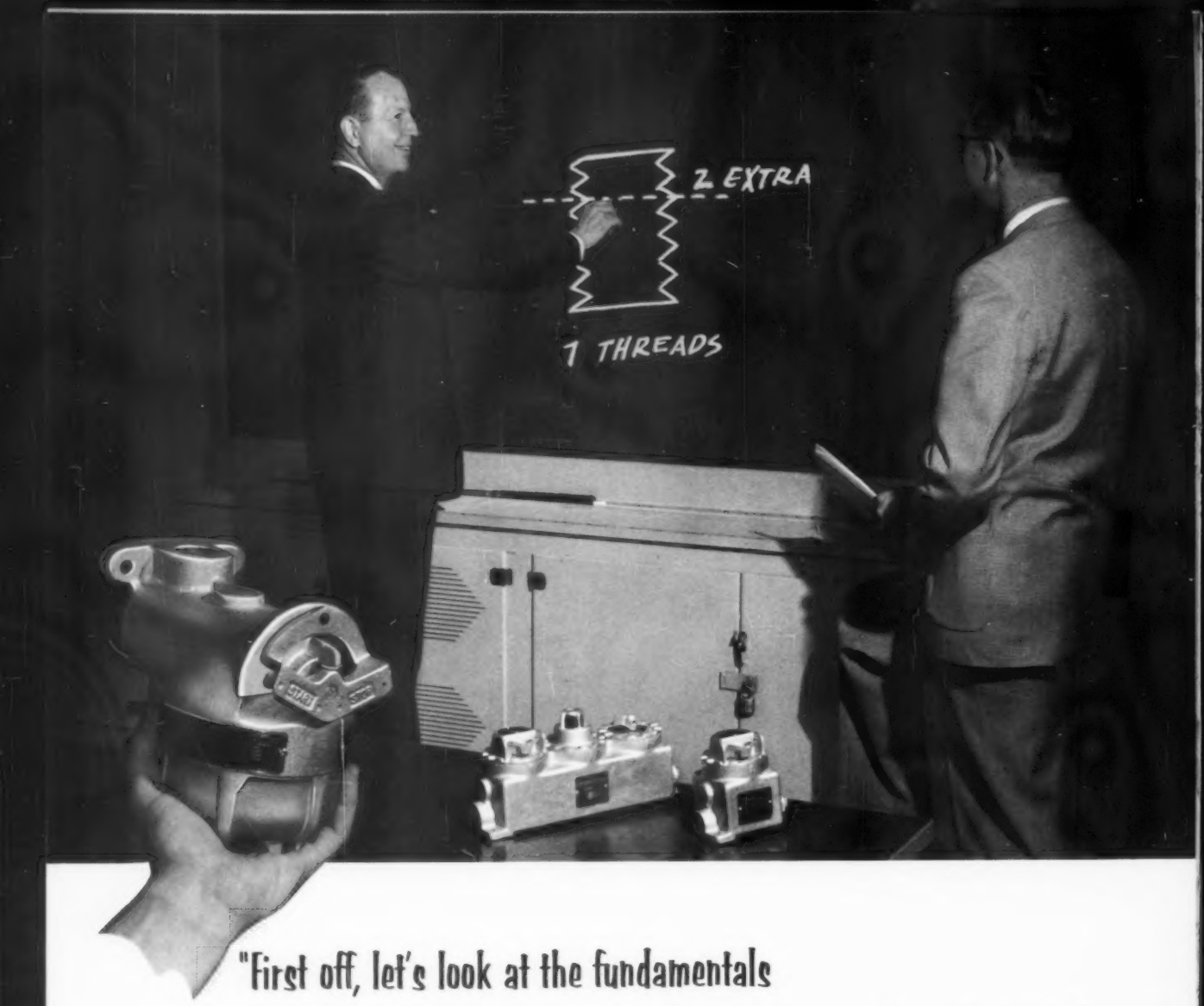
"At Crouse-Hinds we treat those laws with great courtesy. We respect them in the very smallest particulars of design, construction and application . . . in every piece of explosion-proof equipment we build.

"That's what the National Board of Fire Underwriters and similar organizations are looking for when they classify every Class and Group in such detail. And that's why they like to see compliance with those requirements in the hands of competent engineers like yourself."

"Charlie, with what's at stake, I have to be competent . . . or else."

"And we're here to help out with the right equipment . . . made exactly for the job you have to do . . .

more ——→



"First off, let's look at the fundamentals of explosion-proof construction."

"Take this OFC Switch Condulet* for example . . . It incorporates all the basic features of Crouse-Hinds explosion-proof construction. The casting is of Feraloy . . ."

"What's that?"

"Feraloy is a special alloy that combines the desirable characteristics of both cast steel and gray iron. It's strong, tough, homogeneous. It machines well and forms full threads."

"How is it on corrosion? We'll get a lot of that."

"Feraloy itself is alloyed for corrosion resistance. In addition, it is triple-layer finished on all surfaces.

"The casing thickness is *four times* stronger than the maximum needed to contain any possible explosion of gas or vapor, without rupturing."

"How about leakage around the threads?"

"These threaded joints are flame-tight. And right there you've got an important extra: For Group C and D locations, UL calls for a minimum of *five* threads to insure cooling of escaping gases. We give you *seven* threads . . . on every threaded joint of explosion-proof Condulets.

"This means if somebody forgets to make a joint or cover 'wrench-tight', chances are *still* very high of having at least five threads fully engaged."

"Good point, Charlie."

"One more thing about threads. Condulets are *taper*-tapped to match conduit threading, and give you tight, rigid joints throughout the system. And there's a deeper recess for complete tightening without bottoming on the integral bushing."

"What about seals?"

"Whenever practical, Condulet explosion-proof equipment is factory-sealed. Wherever it's not, we have a big selection of seals, breathers and drains to choose from."

"Wish it were physically possible for you to factory-seal everything, Charlie. Everybody would feel safer, I'm sure. O.K. . . . what's next?"

**CONDULET is a coined word registered in the U. S. Patent Office. It designates a brand of products made only by the Crouse-Hinds Company.*

"Charlie, we can't afford to overlook anything that needs to be explosion-proof."

"Can we get everything we will need from you?"

"Yes. Our ads say we have the 'world's broadest line' of explosion-proof electrical equipment. That's really true.

"Take the items in this display: Most of them are Condulets. There are more than 15,000 items in just that one line . . . everything from junction boxes to process control centers . . . in explosion-proof, dust-ignition-proof, or conventional construction.

"Just to show how complete the explosion-proof part of the line is, here are all kinds of warning lights, horns and sirens . . . even exit signs."

"One of our most important needs in the new plant is communications. What have you got there, Charlie?"

"Well, here's a choice of manual, dial and magneto type telephones for desk use, or for wall or panel mounting for use on common or local battery systems."

"How loud can you set the bell for our noisy spots?"

"You can have auxiliary bell *or* horn signals set to wake up a hibernating bear, if you like.

"Now here's something you might need in y search or quality control setup – instrument Co to provide enclosures with glass fronts for meters, and so on. And here are photo-electric Condu colorimetry, counting, or automatic control."

"We'll need plenty of that."

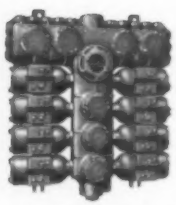
"Then there's lighting. Name the kind and am light you need . . . incandescent or fluorescer bench, area or flood . . . and Crouse-Hinds has

"We're pretty proud of our new EVA Mercury – because for the first time, it offers you a UL fixture which makes mercury vapor advantages av in hazardous areas: 2.5 times more light, and seve longer lamp life than incandescents."

"Terrific. Anything that cuts the frequency of i ing in hazard zones is welcome!

"But Charlie . . . making all this approved equi you must have a UL man on hand most of the

"That's right . . .



Panelboards

Plugs and Receptacles

Flexible Couplings

Instrument Enclosures

Process Control Board Components

Pilot Lights

Swit

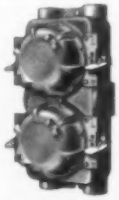
Lighting Fixtures

Fixture Hangers

Control and Indicating Stations

Unions

Seals



Motor Starters and Circuit Breakers

Signals

proof."

need in your re-
rument Condulets
for meters, gauges,
tric Condulets for
ontrol."

ind and amount of
r fluorescent . . .
e-Hinds has it.
A Mercury Vapor
s you a UL-listed
vantages available
t, and seven times

quency of relamp-

proved equipment,
most of the time."

"With UL-listed equipment in every Class and Group, we work very closely with the UL inspector-in-residence."

Switches

Breathers and Drains

Communication Equipment

Signals, Alarms

Fittings

Junctions

"This is his office right here. A senior Crouse-Hinds engineer has the full-time job of Underwriters' Laboratories Coordinator. Under his guidance, our engineering staff carries out UL requirements on product development . . . and on design modifications that are made to meet customer specifications.

"Actually, every classification of UL-listed equipment we make is checked by the UL inspector-in-residence.

"In a petrochemical plant like the one you're building, you're certain to have Group A and B locations, with hydrogen and perhaps acetylene present. We have approved equipment for A and B areas.

"You may have some hazardous dusts around, too . . . resins or coke or magnesium, and so on. If so, we can supply UL-listed dust-ignition-proof electrical equipment for every Group under Classes II and III, also.

"Looks like you've got the whole ball of wax on products, Charlie. Anything else?"

"There sure is – Crouse-Hinds Field Service . . .

more ⟶

"Superior design begins where it should ...with your needs."

"This new EWC Control and Indicating Station is a good example.

"Here is a type of control that is located outdoors as often as not. Because of this, we have designed it to be water-tight . . . as well as explosion-proof and dust-ignition-proof. It will take hurricane rains – or direct streams of water in washing-down operations – without breaking the Neoprene O-Ring seals at cover, shafts and pilot light jewels."

"Aren't those threaded covers?"

"Threaded covers, threaded operating shafts, *and* threaded pilot light cover – which is a new development for this type of device. And it includes all the other features we looked at in the OFC a little while back.

"It's versatile, too . . . available with pilot lights, heavy-duty pushbutton stations, selector switches . . . in various combinations . . . and in single, double or triple gangs.

"The EWC shows particularly well that good design is the sum of a great variety of things, big and small, depending on the job a device has to do. But they're all pointed toward giving you explosion-proof equipment that's safer, easier to install and operate, longer lasting, and *tuned to your needs*. That's true of the EWC . . .

"...or this explosion-proof Arktite* Plug and Receptacle."

"This Arktite is quite a work of art in its way. It conforms to UL test requirements throughout. You can make or break contact at full load *without* disconnect switches."

"No flashover?"

"Flashover is impossible. Each contact is insulated in a separate chamber. All arcs are snuffed out by pressure-deionization and lack of oxygen."

"Swell . . . but how about the grounding?"

"The male grounding contacts are *longer* than load contacts . . . so the plug shell and tool are grounded *before* power circuit is made and remain grounded until *after* it's broken. Chances for human error are practically zero with the Arktite."

*Registered

"Customers say the only thing better than our products is the help you get from our field engineers."

"I'd like you to meet one who just flew in to work out some customer specs and delivery timetables. I hope he won't be embarrassed if I tell you what makes him tick.

"First of all, he's an Engineer. He's had an extended period of in-plant training in all departments. He has handled just about every kind of hazard problem and recommendation you can think of. He can help analyze your needs, and recommend the safest, most economical equipment for specific applications.

"He has know-how . . . backed up by plenty of know-*why*. He knows where the hidden probabilities of explosions do their hiding. He knows the various *degrees* of hazard . . . which means he knows where you can afford to save money by installing equipment adequate for Division 2 conditions.

"He knows what you have at risk in lives, plant, equipment, materials and inventory. And he's completely oriented to giving them the best possible protection at the lowest possible cost . . . without ever flirting with those physical laws we were talking about.

"There are 85 more field engineers like him on our staff. And I know you'll enjoy doing business with any one of them. O.K.?"

Well, Charlie . . . all I can say is if that's the service that comes with the product, I'm sold on Crouse-Hinds!"

If you have a hazardous-area problem, why not call in your nearest Crouse-Hinds Field Engineer for practical, down-to-earth suggestions? In the meantime, send for our Catalog No. 3400, containing detailed descriptions and specifications on Crouse-Hinds Explosion-Proof Electrical Equipment.

CROUSE HINDS

MAIN OFFICE AND FACTORY: SYRACUSE, NEW YORK

Crouse-Hinds Company of Canada, Ltd., Toronto, Ont.
Crouse-Hinds Instrument Company, Inc., Silver Spring, Maryland

● CONDULET® ELECTRICAL EQUIPMENT (Explosion-Proof and Conventional) ● FLOODLIGHTING
● TRAFFIC CONTROL SYSTEMS ● AIRPORT LIGHTING and WEATHER MEASURING EQUIPMENT

These products are sold exclusively through electrical distributors. For application engineering help, contact one of the following offices: Atlanta Baton Rouge Birmingham Boston Buffalo Chicago Cincinnati Cleveland Corpus Christi Dallas Denver Detroit Houston Indianapolis Kansas City Los Angeles Milwaukee New Orleans New York Omaha Philadelphia Pittsburgh Portland, Ore. St. Louis St. Paul Salt Lake City San Francisco Seattle Tulsa Washington **Resident Representatives:** Albany Baltimore Charlotte Chattanooga Reading, Pa. Richmond, Va.

When you need plastics

...it pays to call an

AUTHORIZED PLEXIGLAS DEALER

Here's why: He is a one-stop source for complete service on PLEXIGLAS* acrylic plastic and a wide range of other plastics and accessories such as cements, paints and cleaners. He is qualified to give fabrication assistance and technical advice. And above all, he can give you prompt delivery on almost any size and thickness of PLEXIGLAS—clear transparent sheets ... transparent and translucent colored sheets . . . patterned, corrugated and extruded sheets . . . and rods and tubes.

PLEXIGLAS

Look for this familiar trademark in the Yellow Pages of telephone directories in most major U.S. cities

Chemicals for Industry

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Representatives in principal foreign countries

Canadian Distributor: *Crystal Glass & Plastics, Ltd., 130 Queen's Quay East, Toronto, Ontario, Canada.*

For more facts circle 528 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

2. Always adjust counter-balancing spring with curtain in fully rolled up position.

3. Never attempt to remove door curtain from the roller shaft without first fully releasing the torque-tension on the counterbalancing spring. Be sure to block or lock the door curtain in full open position before, and during time the spring tension is being fully released. Caution must be taken in rolling the door curtain down after the spring is released since its full weight will then be unrestrained. *From a release of The R. C. Mahon Company, Detroit, Mich.*

Double-Decker Conveys Fragile Parts

IN SETTING UP a conveyor system to transport newly molded spark plugs from molding locations to curing-oven transfer carts, the AC Spark Plug Div. of the General Motors Corp., Flint, Mich., had to provide a smooth ride for the ceramic plugs so that they would arrive at the transfer carts in perfect condition. At the same time, the conveyor had to withstand the abrasive action of the saggers in which the spark plugs are transported. The saggers are made of refractory baked clay and weigh about 30 lb when loaded.

These two requirements were met by the installation of steel belt conveyors. The belts ride smoothly on wood runner-supports, providing jog-free transportation for their loads, and are not damaged in any way by the abrasive saggers.

The problem of returning empty saggers to the molding stations was solved by installing an upper level roller-conveyor along which empty saggers could be pushed to the molding stations. There are three such double-deck conveyors, each servicing a number of molding stations. *From a release of Sandvik Steel Belt Conveyors, Div. of Sandvik Steel, Inc., Fair Lawn, N. J.*

Double-deck conveyor gently carries loaded saggers to transfer carts, returns "empties" to molding stations.

Soft Ride for Test Equipment

CONSTANT SPEED drives manufactured by the Sundstrand Machine Tool Co., must be tested for their ability to maintain a constant output speed even though other parameters are varying.

(Continued on page 46)

Incinerator Gases Plus Draft Induction Fan Help Produce Steam for Heating

UP TO 5000 LB per hr of steam are produced by the City of West Hartford, Conn., by burning wastes consisting of paper, boxes and garbage in an incinerator which is connected by breeching to a boiler. Capacity of the plant is 350 tons of mixed refuse per 24 hr. Plant operates an average of 8 hr per day, five days a week.

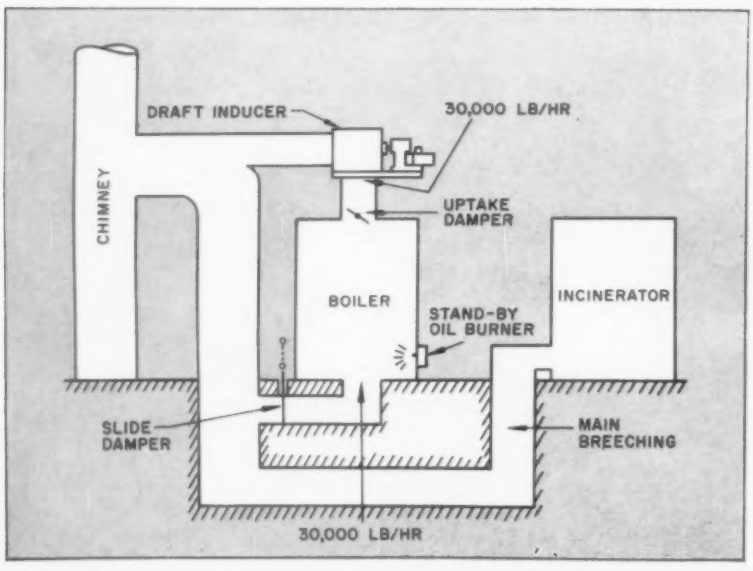


Diagram shows arrangement of incinerator, boiler and draft inducer. Paper, boxes and other wastes burned in the incinerator are source of heat, producing up to 5000 lb per hr of steam, daily. Steam is used for heating purposes.

Hot incinerator gases are pulled through the boiler at rates up to 30,000 lb per hr by a special draft inducer placed on top of the boiler. Gases enter at 1200 F and are exhausted through the draft inducer, at 520 F, to the chimney.

The incinerator is started and shut down daily but the load burned varies during the day according to the amount of refuse collected.

To handle these wide variations in draft requirements, a variable speed drive with pneumatic controls was specified for the inducer fan. Automatic modulated operation is obtained through a speed range of 3:1 when incinerator gases are being handled.

When the incinerator is not operating, a standby oil burner produces steam for heating. *From a release of L. J. Wing Mfg. Co., Linden, N. J.*

Designed expressly to fulfill the requirements of Associated Factory Mutual.

New Industrial Gas Pressure Switch offers 4 exclusive safety features

USE the new Honeywell C437 Industrial Pressure Switch as Safety Cut-offs on multiple burner gas installations . . . as pressure controllers for hazardous gases . . . or as differential controllers for air or non-hazardous gases. It is simply designed, yet provides complete protection.

The C437 Industrial Gas Pressure Switch is available in A and B models. The A model breaks contact on a *drop* in pressure. The B model breaks contact on a *rise* in pressure.

1. Sealed Pressure Chamber—Should the diaphragm rupture from over pressure or any other cause, gas can't escape into the switch compartment or to the atmosphere. The pressure chamber is fitted with a pipe tap to permit venting to the stack.

2. Protected Settings—All adjustments are inside the case for protection against careless or accidental manipulation. A metal plate on the side of the case must be removed before changes in adjustment can be made.

3. Ever-Visible Switch Position and Control Settings—The entire cover of the pressure switch is a window. Position of the mercury switch and adjustment of the control settings can be determined at a glance.

4. Lockout Mechanism—An optional safety feature, when manual resetting is desired. The lockout mechanism prevents the switch from remaking contact after pressure has once dropped below the setpoint . . . even though pressure returns to normal. The lockout release button is the only adjustment that can be manipulated without removal of the protecting metal plate.

For complete information, call the nearest Honeywell office. A Honeywell field engineer is as near as your phone.

MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa.

● **REFERENCE DATA:**

Send for Specification S1811-1 Honeywell Gas Pressure Switch C437A

Honeywell

H HONEYWELL *First in Control*

Materials-Handling Made Easy

NØELTING
Faultless Casters
Give you many new ways
to cut your handling costs

NØELTING
Faultless
Casters

These three Faultless Caster installations are examples of the versatility and broad scope of the Faultless line. Whether you want to move 50 pounds of delicate instruments or 15 tons of sheet steel, Faultless—the "Complete Line" backed by nearly three quarters of a century of caster-making experience—assures you the right casters to best do the job.

FREIGHT HANDLING
Series 900 and 9700 Casters enable one man to handle complete loading job. Loading time has been cut in half and shipments go out more speedily.

WORK SCAFFOLDS
Series C900 Caster with dual acting brake which locks both swivel and wheel action—combines stability, mobility and safety for work scaffolds.

V-GROOVED TRACK ASSEMBLY LINE
Series 600 Caster with V-grooved wheel eliminates ten handling operations in production assembly of refrigerator and freezer doors.

Ask your Distributor!

Your nearby Faultless Industrial Distributor maintains a substantial inventory of Faultless Casters for immediate delivery. He and one of the strategically located Faultless Sales Engineers are available to work with you on every handling problem in your plant. Both are listed in the phone book Yellow Pages, under "Casters," beneath the Faultless heading.

INDUSTRIAL DISTRIBUTORS · SERVING INDUSTRY ECONOMICALLY · THE RIGHT HAND OF PRODUCTION

WRITE FOR FREE CONDENSED 20 PAGE CASTER CATALOG

Faultless Caster Corporation EVANSVILLE 7, INDIANA
Send Free copy of condensed 20 page Caster Catalog, 157-G

Name _____ Title _____
Firm _____
Address _____
City _____ Zone _____ State _____

For more facts circle 530 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

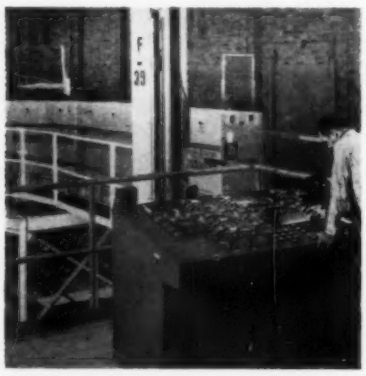
Delicate test equipment is moved easily and safely on caster-equipped dollies.

For this job, Sundstrand uses a number of delicate test systems of their own design. Mobilizing this equipment permits it to be transported from one test stand to another.

By mounting the instruments on wooden dollies equipped with 5-in. diam, semi-pneumatic casters, they can be moved from test stand to test stand as required, quickly and easily. *From a release of Faultless Caster Corp., Evansville, Ind.*

Conveyor Control System For Appliance Trains

SHIPPING AT Appliance Park has been speeded up and simplified by installation of a specially designed conveyor control system. Manufactured by the company's Industry Control Department,



Control panel for conveyor system that can route up to 1250 appliances an hour.

JENKINS PRACTICAL PIPING LAYOUTS

82

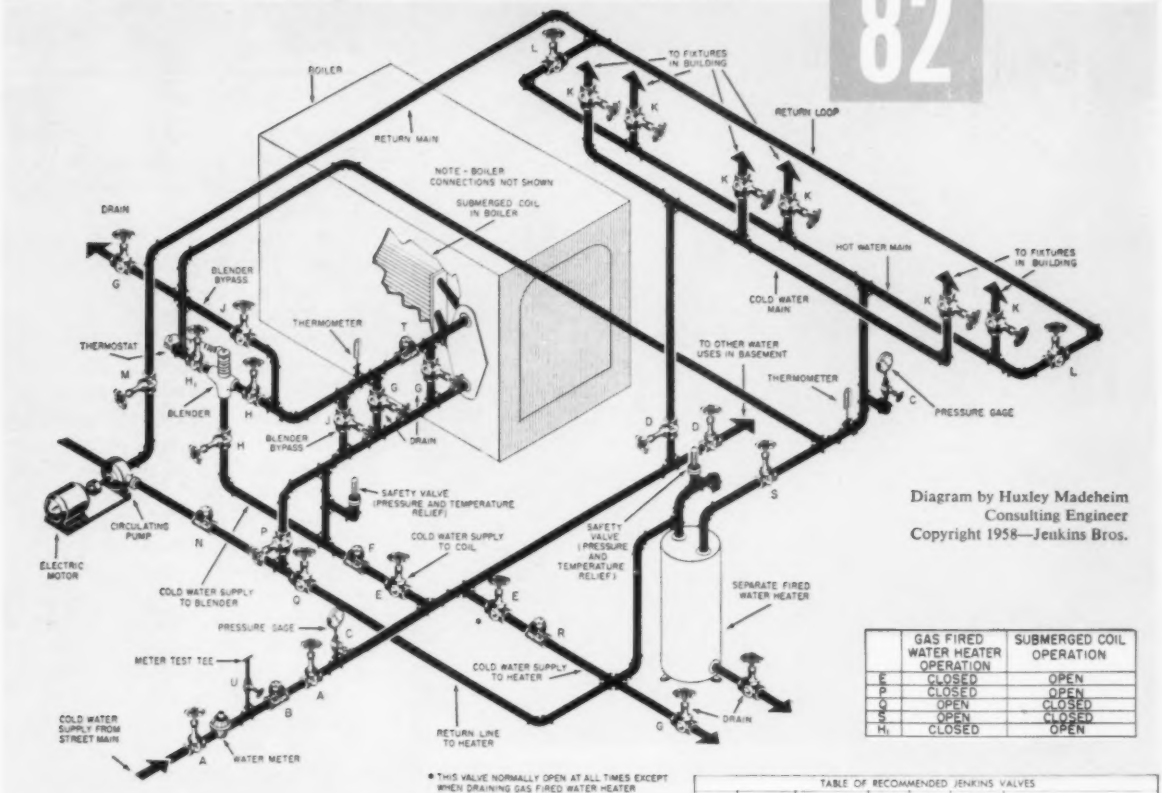


Diagram by Huxley Madeheim
Consulting Engineer
Copyright 1958—Jenkins Bros.

	GAS FIRED WATER HEATER OPERATION	SUBMERGED COIL OPERATION
E	CLOSED	OPEN
P	CLOSED	OPEN
Q	OPEN	CLOSED
S	OPEN	CLOSED
H_1	CLOSED	OPEN

* THIS VALVE NORMALLY OPEN AT ALL TIMES EXCEPT WHEN DRAINING GAS FIRED WATER HEATER

How to plan piping connections for

A HOT WATER SUPPLY SYSTEM

using both Submerged Coil and Separate Water Heater

Continuous hot water for general use is a requirement of many small office buildings, taxpayers, stores, and sections of multi-story buildings. In this layout, two conventional methods of supplying hot water are shown in combination, assuring continuous supply throughout the year with a minimum investment and maximum convenience.

A submerged coil utilizes as a heat source the main boiler whose primary function is to furnish heat for the building. A separately fired heater is employed to provide continuous hot water should the main boiler be shut down during the non-heating season or for maintenance. Connections to both units of hot water generating equipment are arranged so that change-over involves only the operation of valves. The distribution system shown incorporates a circulating pump and return loop, to guarantee hot water at the fixtures at all times.

A Blender valve with the submerged coil permits tempering water to desired temperature, and is equipped with bypasses to permit blender maintenance and emergency repairs without a shutdown. The separately fired heater has its own thermostatic control, so does not require a blender valve.

Safety valves protect both hot water generators. These valves are installed without shutoff to prevent damage and especially damage from possible steam generation in the separately fired heater. Also, it is recommended that cold water admission valve "E" to this heater be left open at all times, except when draining heater, to prevent formation of a vacuum or burning of heater if evaporated dry.

Bronze valves are used throughout because they give best service with most conditions of city water. All gate valves are of the traveling spindle type, which indicate position of wedge.

Jenkins Fig. 106-A screwed end bronze globe valve, (or its equivalent Fig. 1270 with socket ends, or Fig. 1270 with solder ends), is used extensively throughout this piping layout. Its renewable composition disc assures drop-tight closure, and it incorporates many other design and construction features which mean economical maintenance and long, trouble-free life.

TABLE OF RECOMMENDED JENKINS VALVES

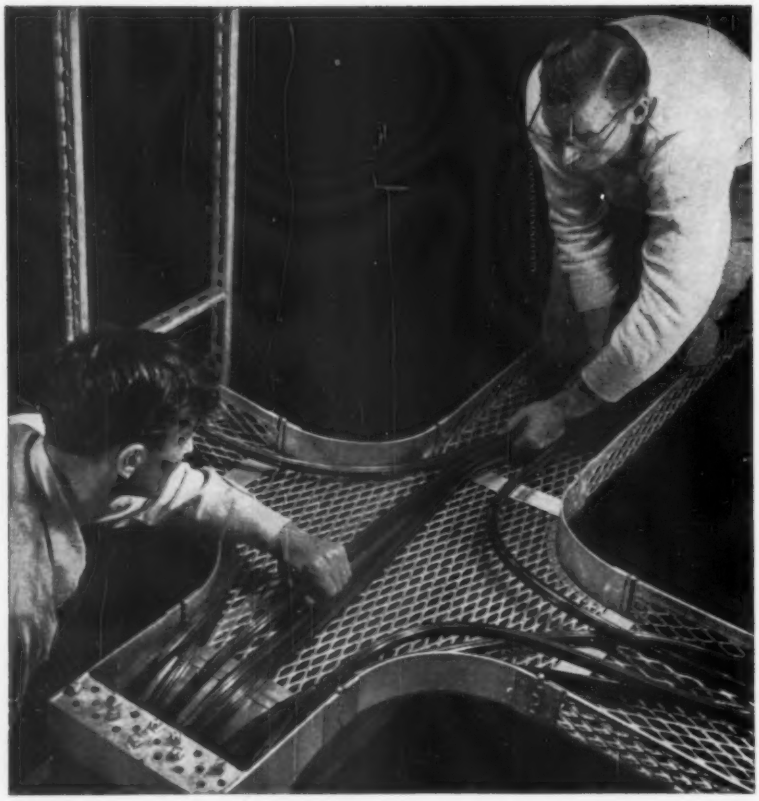
Code	Quan.	Screwed	Socket	Solder	Type	Service
A	2	Fig. 47-U	1273	1242	Gate	Shutoff Cold Water Supply
B	1	Fig. 92-A	1272	1222	Check	Prevent Backflow to Main
C	2	Fig. 743-G			Needle	Control Pressure Gage
D	2	Fig. 47-U	1273	1242	Gate	Shutoff Cold Water Dist. System
E	2	Fig. 106-A	1270	1200	Globe	Control Cold Water Supply to Heaters
F	1	Fig. 92-A	1272	1222	Check	Prevent Backflow from Coil to Main
G	5	Fig. 106-A	1270	1200	Globe	Control Drains
H	3	Fig. 47-U	1273	1242	Gate	Shutoff Blender
J	2	Fig. 106-A	1270	1200	Globe	Control By-pass about Blender
K	6*	Fig. 106-A	1270	1200	Globe	Control Water Supply to Individual Fixtures
L	2	Fig. 106-A	1270	1200	Globe	Control Flow through Return Loop
M	1	Fig. 47-U	1273	1242	Gate	Shutoff Suction Circulating Pump
N	1	Fig. 92-A	1272	1222	Check	Prevent Backflow through Circulating Pump
P	1	Fig. 106-A	1270	1200	Globe	Control Flow Return Water to Coil
Q	1	Fig. 106-A	1270	1200	Globe	Control Flow Return Water to Heater
R	1	Fig. 92-A	1272	1222	Check	Prevent Backflow from Heater to Main
S	1	Fig. 47-U	1273	1242	Gate	Shutoff Hot Water Supply from Heater
T	1	Fig. 92-A	1272	1222	Check	Prevent Backflow through Coil
U	1	Fig. 106-A	1270	1200	Globe	Control Meter Test Line

*Dependent on quantity of fixtures.

To assure efficiency when planning a major piping installation, consult with accredited piping engineers and contractors, and select valves from the Jenkins Catalog.

FREE enlargement of this layout No. 82 sent on request to Jenkins Bros., 100 Park Ave., New York 17.

JENKINS
LOOK FOR THE JENKINS DIAMOND
VALVES
SINCE 1864
Jenkins Bros.
Sold through Leading Distributors Everywhere



Here's a cable supporting system with space reserved for future needs

Cope cable trough gives your system room for growth!

Cope cable trough design gives you greater load carrying capacity per dollar *now—plus built-in system expansibility* that will minimize the cost of future system expansion. A *single* 24" wide section of Cope cable trough supports as many cables as 16 lengths of 4" conduit. Additional cables can be quickly and easily laid in *existing* trough as new equipment installations require. The lower *first* cost of a Cope cable trough installation *saves you money a second time* when you need to increase or expand your power distribution system!

Reduced System Maintenance Costs. Easy-to-get-at Cope cable trough also eliminates costly maintenance problems down the line. Once cable is laid in Cope expanded metal trough, it's readily accessible for easy inspection, repair . . . or *re-routing* when system changes are required. And greater installation flexibility of lightweight Cope cable trough and a complete line of system accessories and fittings reduce design time up to 25% for laying out the most complicated system . . . assure easy system maintenance even in the most cramped quarters.

Cut Costs Three Ways. You save *three ways* when you specify Cope cable supporting systems with pin-type coupler . . . trough, ladder or channel.

- **LOWER FIRST COST**
- **LOWER INSTALLATION COSTS**
- **LOWER SYSTEM MAINTENANCE COSTS**

Discuss these advantages for *your* installation with a qualified Cope representative—or write to T. J. Cope Division, Rome Cable Corporation, Collegeville, Pa.

1008

T. J. COPE *Division*
ROME CABLE CORPORATION

For more facts circle 532 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

this statically controlled conveyor, enables an operator to route up to 1250 appliances per hour to loading docks.

Heart of the system is a shift register control which registers an appliance "train" for a particular destination selected by the operator at the control console. The system automatically shifts the register as dictated by the actual physical situation on the conveyor. As the train moves along the conveyor, photo-electric units detect its position and transmit signals to static logic units which, in turn, shift or cancel the register according to signal.

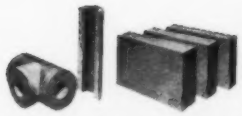
When a train moves onto a spur, its code is automatically cancelled. If a train selected for a given spur is unable to enter that spur, its code remains on the board and it moves onto an alternate spur. *From a release of General Electric Co., Schenectady, N. Y.*

Remote Controller Checks Wax Temperature

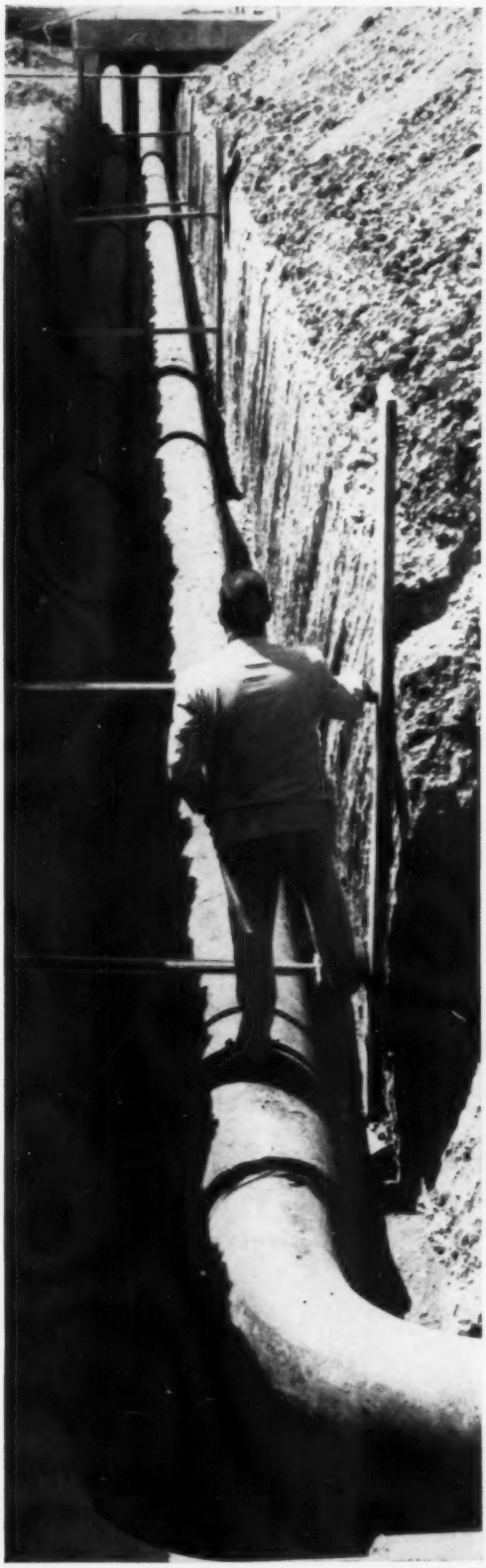
OUTDOOR PUMP intake lines to storage tanks used at the Nashua Corp., Nashua, N. H., for storing

Selector switch on controller enables each operator to check temperature of tank in turn to pinpoint trouble spot.

liquid paraffin wax, are particularly vulnerable to "freezing," that is, having the wax congeal and form a solid plug in the line. When this happens, the pipe in-



FOAMGLAS® INSULATION / waterproof, vapor-proof, strong, can't burn, acid-proof, vermin-proof, dimensionally stable



IBM® buried its piping problems and saved 50% on installation— thanks to **FOAMGLAS** insulation

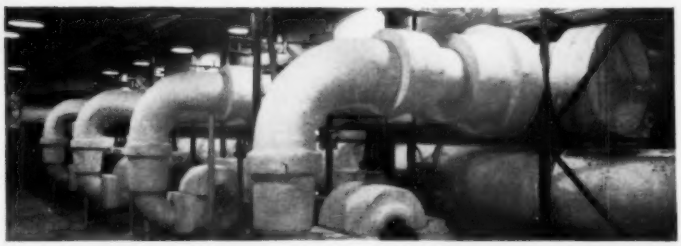
FOAMGLAS insulation makes installing underground piping simpler, less costly. Here's a case in point.

International Business Machines Corporation buried over 7,000 feet of chilled water piping—part of the central air conditioning system at its new San Jose, California, plant. Insulating the piping with Pittsburgh Corning's moisture-proof FOAMGLAS—the unique cellular glass insulation—cut their installation costs in half. Here's how.

Because it is completely impervious to ground water and soil acids, FOAMGLAS will maintain its original insulating value . . . protecting IBM's steel pipe against corrosion. This fact made direct burial of the insulated pipe practical. There was no need for a costly protective concrete tunnel or a pre-sealed conduit to house the pipe. Either would have boosted installation costs from 200% to 300%. FOAMGLAS eliminated this extra cost.

FOAMGLAS is the most dependable—and often the least costly—solution to *your* insulation problems . . . for exposed or buried piping, equipment and plant structures. Write for complete information in our latest industrial catalog.

PC Glass Blocks are another outstanding building product of Pittsburgh Corning Corporation.



Above ground FOAMGLAS insulation insures constant thermal efficiency on IBM's chilled water lines.

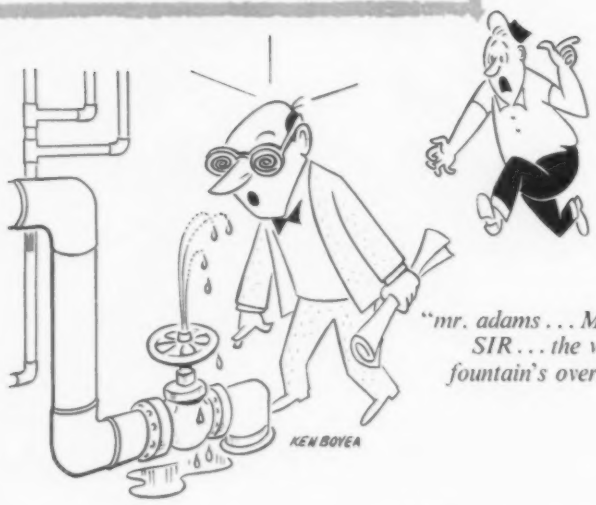
Below ground piping gets two-in-one protection—against heat gain and against corrosion—from the sealed glass cells of FOAMGLAS.

PITTSBURGH CORNING CORPORATION

Dept. PE-128, One Gateway Center, Pittsburgh 22, Pa.
In Canada: 57 Bloor Street West, Toronto, Ontario

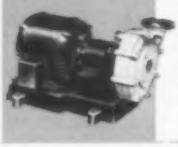
For more facts circle 533 on Reply Card

Life in these excited states...



"mr. adams... Mr. Adams... SIR... the water fountain's over here!"

"WAM" PUMP
finest you can buy



Highest pumping efficiency, with faultless corrosion resistance. Hard rubber casing and impeller; Hastelloy *C* shaft. 80 gpm. *Bul. CE-55.*

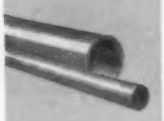
Why men of vision choose ACE equipment

Men with a weakness for profits somehow manage to keep equipment "on stream" full time with no corrosion shutdowns. You'll find they reach for Ace corrosion-engineered equipment time and again. Now nine kinds of Ace pipe ... plus pumps, valves, tanks, and special equipment to solve most any corrosion or contamination problem.

THRIFTY-THROATED VALVES

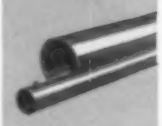
Liquids never touch metal in Ace diaphragm valves! Rubber or plastic-lined cast iron, or solid plastic bodies. Sizes ½ to 6". Ask for facts.

ACE-ITE
all-purpose toughie



High-impact, rubber-plastic, most economical for average chemicals. ½ to 6". Screw or solvent welded fittings. Valves ½ to 2". NSF-approved. *Bul. 80A.*

RIVICLOR
ageless strength



All-purpose rigid PVC. Sched. 40, 80 & 120, ½ to 4". Threaded or socket-weld fittings. Valves ½ to 2". NSF-approved. *Free Bul. CE-56.*

ACE processing equipment of rubber and plastics

AMERICAN HARD RUBBER COMPANY
DIVISION OF AMERACE CORPORATION
Ace Road · Butler, New Jersey

For more facts circle 534 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

sulation must be stripped and the line heated with blow torches to melt the plug.

To help avoid allowing the wax to fall below a preset temperature that will keep it liquid, its temperature is monitored by a four-point thermistor controller.

The 80-100 ft-long leads from the thermistor probes were lowered through the top of each storage tank into the wax. Each probe is supported by a length of chain which reaches to within a few feet of the tank bottom where the temperature is most critical.

If the temperature should fall below the preset point the thermistor controllers will sound the alarm. The operator can quickly pick out which tank is in trouble, by checking the temperature indicator on the control panel. *From a release of Fenwal, Inc., Ashland, Mass.*

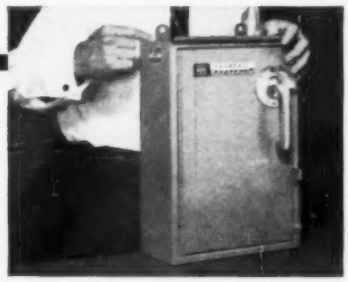
Scrubbers Control Fumes

IT WAS IMPORTANT that the fumes from several processes at Morton Chemical Company's plant in Ringwood, Illinois be prevented from escaping to the atmosphere.

It so happened that the fume

One of the fume scrubber installations at the Ringwood plant which removes hydrogen chloride fumes during the manufacture of photographic chemicals.

Before you buy Motor Controls...
CONSIDER THESE FEATURES!

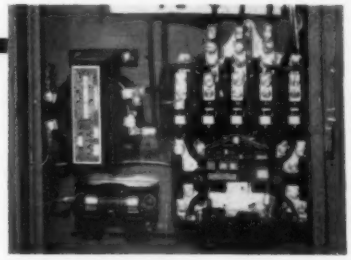


SUPERIOR ENCLOSURE CONSTRUCTION

Welded seams...sturdy piano hinge...slotted Hex cover retaining screws...cast aluminum handle...padlock provisions on handle *and* door...oil resistant neoprene gasket...mechanical cover interlock...rust-proof finish.

COOLER, SAFER SWITCHES

Visible blades...crossbar *under the blades*...deionizing arc quenchers.. dual switchblade construction...only 2 joints per pole...pressure-type solderless lugs.



INLINE SOLENOID STARTERS

Easy-to-change, silver cadmium contacts...contact assembly rides on ball bearings...operating coil easily accessible...flexible coil leads...bi-metallic overload relay for manual or automatic resetting.

FEDERAL PACIFIC'S TYPE "K", NEMA XII COMBINATION MOTOR STARTER

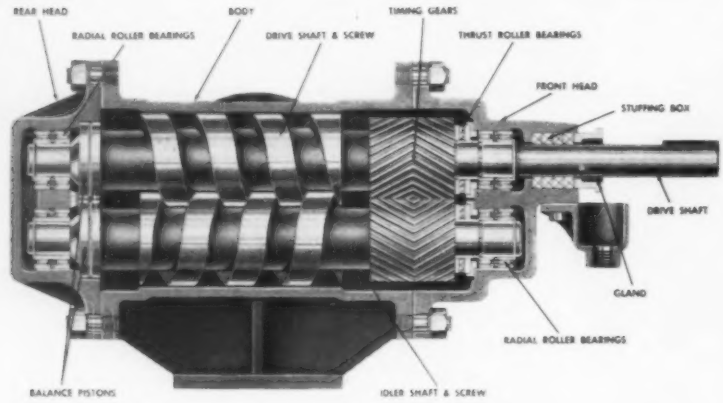
Designed for mass production industrial equipment, the quality features found in the Type "K" are typical of the kind of construction that goes into every device in the Federal Pacific line. Federal Pacific's manual or magnetic motor controls are available in NEMA sizes 0 through 5—with accessories to meet all practical requirements. Bulletin 514 gives full details on combination starters. For this or for specific information to cover your particular needs, write to: FEDERAL PACIFIC ELECTRIC COMPANY, General Offices: Newark, New Jersey.

FEDERAL PACIFIC

The Best in Electrical Distribution and Control Equipment

For more facts circle 535 on Reply Card

SIMPLICITY lowers the cost of this WARREN TWIN SCREW PUMP

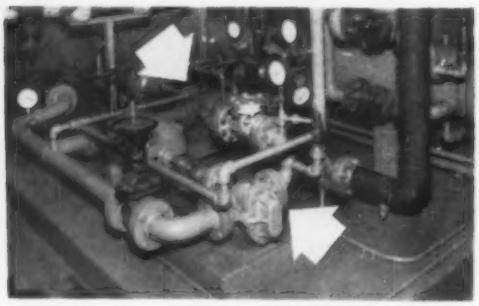


Here's an inside view of a high-speed screw pump that will do the work of other top quality rotary pumps costing twice as much!

Notice the simple construction of this Warren Twin Screw Pump, and the minimum number of parts. The compactness means low initial cost . . . and because no special foundation is needed, installation costs are minimized. No modification is required for vertical operation where floor space is extremely limited, or where the driver must be elevated to prevent flooding.

Maintenance of this efficient type TS pump is also economical. By removing the rear head only, rotating elements can be withdrawn *without disturbing the piping or motor*, and repair parts *that need no field machining* can be shipped immediately from stock.

Four sizes of type TS Screw Pumps are available for capacities to 550 GPM and discharge pressures to 350 PSI over a wide viscosity range. They are particularly suited for *fuel oil services* and other heavy duty oil services requiring a constant, pulseless flow. An ideal application is pictured below.



Two Warren Type 337TS Twin Screw Pumps on *fuel oil burner service* are shown in this installation at the Holyoke, Mass. Gas & Electric Department Plant.

WRITE FOR BULLETIN 255

for more detailed information about the TS Screw Pump that does the job for about one-half the cost.

WARREN

CENTRIFUGAL · SCREW · RECIPROCATING · ROTEX

WARREN PUMPS, INC.

WARREN, MASSACHUSETTS

P-37

For more facts circle 536 on Reply Card

PLANT ENGINEERS' DIGEST

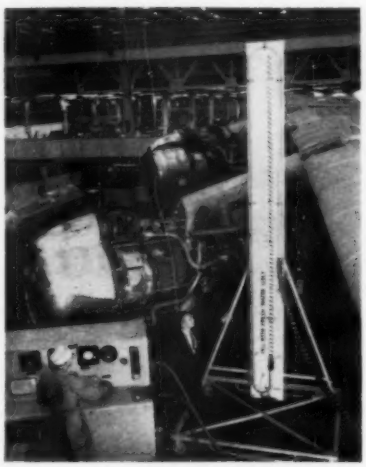
(Digest begins on page 36)

sources were at scattered points in the plant and, because of this, it was necessary to have separate installations in continuous operation. The company installed Schutte and Koerting fume scrubbers to take care of the fume removal jobs.

In operation, a caustic solution circulated through the scrubber creates the draft required to draw the fumes from the process inside the building, and then neutralizes the fumes. The only power requirement is that of the pump used to circulate the caustic solution.

The fume scrubber is constructed of Haveg, a material completely resistant to hydrogen chloride. Inasmuch as complete neutralization of the fumes occurs during the intimate contact with caustic solution in passing through the scrubber, steel was used for construction of the separator tanks and stack. *From a release of Schutte and Koerting Company, Cornwells Heights, Pa.*

King-Size Manometer



This 14-ft manometer is used by Boeing Airplane Company as a safety device in pressure testing the wing fuel cavities of the 707 jet transport. The air pressure used for testing is fairly critical, and this giant manometer is sensitive enough so that test pressures are reached without the possibility of structural damage. (From a release of Boeing Airplane Co., Seattle, Wash.)

PVC PIPING NEWS

PUBLISHED BY TUBE TURNS PLASTICS, INC. • LOUISVILLE 1, KENTUCKY

KEY TO BIG COST CUTS

Users report UPVC piping slashes first costs, stops maintenance

Plants, large and small, are switching to unplasticized polyvinyl chloride (UPVC) piping for corrosive services to make these important savings in first costs and in operating costs:

Lower materials costs. UPVC piping materials cost substantially less than metals, alloys or lined material commonly used in the same services.

Lower installation costs. It can be erected easily and quickly. Widely used socket type joint can be made in about a minute with solvent cement and a brush. Threaded type joint also easily made. UPVC piping is easy to handle . . . weighs ½ to ⅙ as much as metal piping. It does not have to be painted.

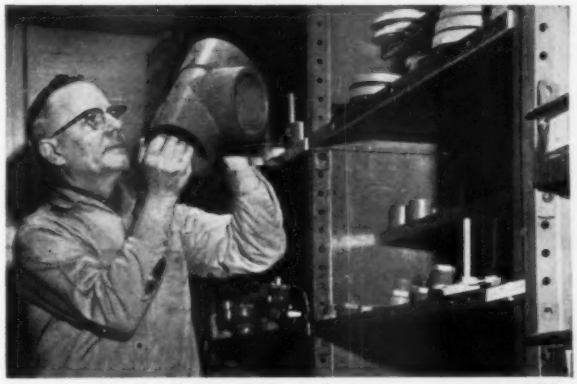
Lower maintenance costs. Users report drastic cost reductions through elimination of piping corrosion, protection against fluid contamination and stopping of galvanic or electrolytic action.

For top quality . . . specify industry's leading line

The **ttp** line of injection molded UPVC fittings, flanges, valves, solvent cement and thread lubricant is available nearby from your Tube Turns Plastics' Distributor. He can supply *all* your needs on one order and can help you with design and installation data. Write us for the complete line catalog, Bulletin 119.

More and more engineers specify UPVC with socket type joints and **ttp** fittings to cut installation costs.

Every **ttp** fitting is fully identified . . . even with a quality control code number . . . to guard your reputation.



Your nearby distributor of **ttp** products can serve you quickly from the industry's most complete line. Above: At Hajoca Corporation, Chester, Pennsylvania.

Leading Manufacturer of Injection Molded Unplasticized Polyvinyl Chloride Pipe Fittings, Flanges and Valves

TUBE TURNS PLASTICS, INC.

Dept. PE-12, 2929 Magazine Street • Louisville 11, Kentucky

For more facts circle 537 on Reply Card

OPERATION AND PRODUCTION —pointers for the industrial plant engineer

Edited by Vern Kempf

Hydraulic Fluid Resists Heat

SPECIAL heat-resistant tractor shovel is used to bank the doors of seven open hearth furnaces with dolomite at the Granite City Steel Company, Granite City, Illinois. With furnace temperatures close to 3000 F, the banking operation must be rapid to protect personnel and equipment from the heat.

The special Michigan tractor shovel is made of heat-resistant steel and has its fuel tank safely in the rear. The operator wears a weldor's mask to guard his face and eyes from the blinding heat.

Preliminary tests with the special shovel showed that the heat made the standard hydraulic fluid bubble and foam resulting in sluggish operation of the hydraulically controlled bucket. To remedy this difficulty, a switch was made to Tydraul Oil 150, a fluid that works effectively at temperatures up to 450 F.

Heat-resistant truck dumps dolomite into furnace to protect door against heat.

With the tractor shovel unloading dolomite at the furnace door, the temperature of the machine may momentarily rise a couple of hundred degrees but will not go high enough to effect the special heat-resistant hydraulic fluid.

Continuous Blast Cleaning Reduces Foundry Handling Costs

CONTINUOUS blast cleaning is reducing cleaning costs by eliminating handling time formerly required with batch cleaning equipment. Unlike batch units, a continuous barrel handles a steady

(Continued on page 56)

Pneumatic Conveying System Solves Dual Production Problem In Handling Plastic Pellets

MANUAL FEEDING of equipment used to press plastic pellets into records was taking an enormous amount of time at Columbia Records, Bridgeport, Connecticut. Pellets had to be collected in sacks, loaded on a truck and then transported to the opposite end of the plant where the sacks were manually lifted and dumped into the press hoppers.

In addition, there was always the possibility of the pelletized material becoming contaminated by dirt, metal chips or glass. If contamination occurred, costly dies could be damaged and require replacement.

Plant Engineer L. C. Reed installed a Spencer pneumatic conveying system which virtually eliminates the problems encountered with the old system. Manual hopper loading is no longer necessary and foreign material cannot enter the piped system.

After the pellets have been cut, they are picked up by vacuum and collected in a combination separator C, Fig. 1. This is provided with a rotary discharge valve for dumping the pellets into the main hopper D. From the bottom of this hopper the material is blown through another rotary valve and deposited into the press hoppers E. Surplus pellets return to a second separator F, which also drops into hopper D.

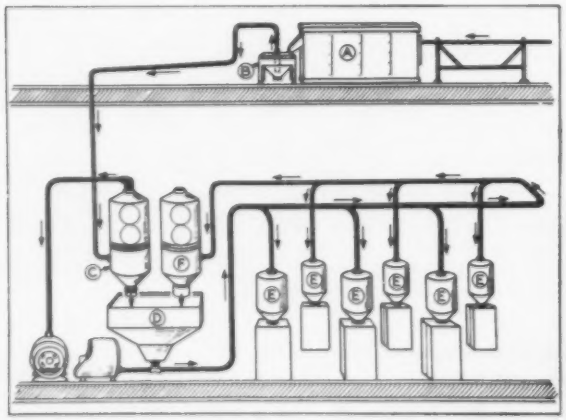


Fig. 1. Two separate air conveyors are used to handle pellets. Note surplus pellets are returned to F and then to D.

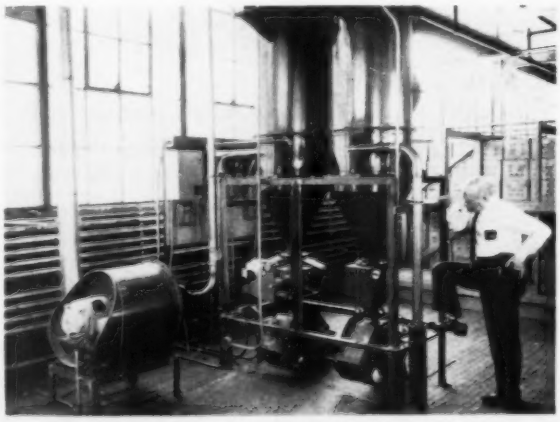


Fig. 2. Combination separators, identified as C and F in diagram, dump into main hopper D located on floor below.

For more facts circle 538 on Reply Card ⟶

NEW from Standard Oil

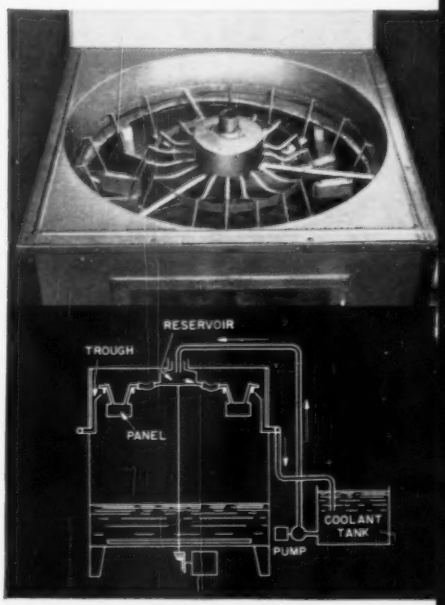
THE MAGIC BOX

Corrosion steals $5.5 billion from industry annually. Standard Oil is in the forefront of the fight to control this loss. Standard's research scientists have developed a new method for measuring the effectiveness of rust preventives. This new test takes less than one-twentieth of the time of previous tests—and is about three times as precise.

Using a controlled humidity cabinet for testing corrosion, these Standard research men installed a system for cooling metal test panels (previously treated with rust preventive) so that their surface temperatures are lower than the temperature in the cabinet. Temperatures of panel surfaces and of cabinet atmosphere are held accurately. Controlling the temperature of the panels controls the rate at which water condenses on them. This in turn (for the first time) permits accurate control of the amount of condensation on the panels. Rust preventives are more speedily and precisely tested. Science, as a result of this work, has a new tool with which to test corrosion.

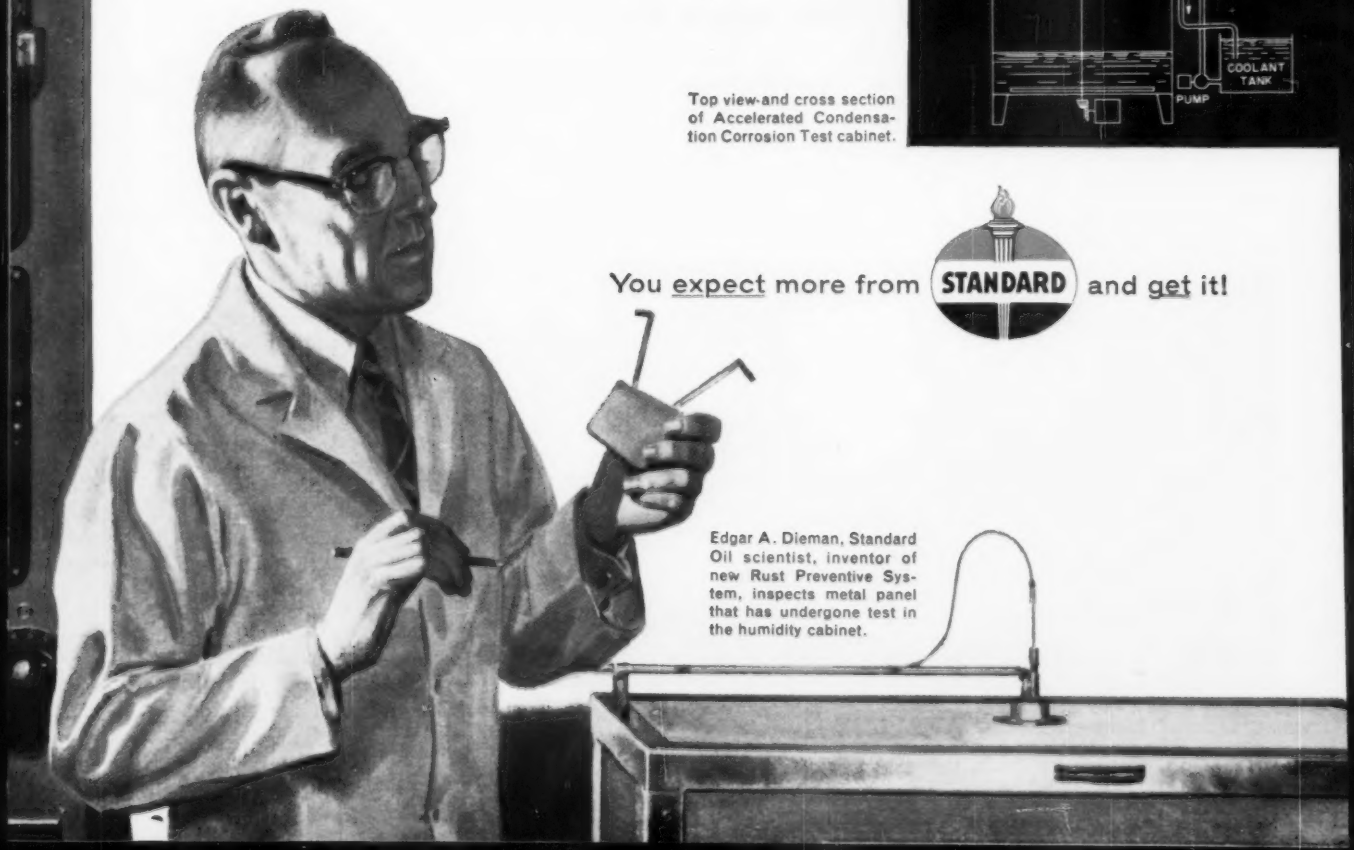
This is the research pay-out industry receives from Standard Oil. This is the something extra that backs up the Standard industrial lubrication specialist who calls on you. This is the something extra found in the products he sells.

To know more about how Standard Oil industrial lubrication specialists—and Standard's research program—can help you, call the Standard Oil office nearest you in any of the 15 Midwest and Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**



Top view and cross section of Accelerated Condensation Corrosion Test cabinet.

You expect more from STANDARD and get it!



Edgar A. Dieman, Standard Oil scientist, inventor of new Rust Preventive System, inspects metal panel that has undergone test in the humidity cabinet.

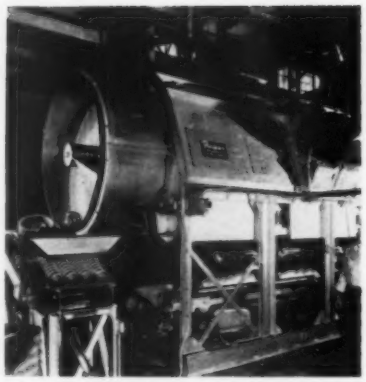
OPERATION—PRODUCTION

(O and P begins on page 54)

flow of work where each piece is blasted, the abrasive removed and the work ejected for conveyance to the next operation.

To meet increasing production demands, the International Harvester Company's Construction Equipment Division, Milwaukee, Wisc., installed a 72-in. diameter Rotoblast barrel that replaces 7 tumbling mills and two large batch type barrels. The equipment recently installed has reduced labor requirements by one third, cut floor space allotted to this operation and reduced maintenance expenses.

Castings are conveyed into the barrel in a continuous stream. Inside the barrel are two rotating steel drums supported and driven by two parallel shafts. In the space between the drums are metal slat conveyors which transfer the work from drum to drum. In the spaces above the slat conveyors



Discharge end of the continuous blast cleaner shows spirally sealed end drum.

and between the drums, two Rotoblast wheels are located so that the length of the blast pattern is parallel with the length of the drums. Lifting cleats on the inner faces of the drums tumble the work through the blast pattern to each wheel, assuring complete cleaning of all pieces of the load.

The end drum of the barrel is spirally sealed from the blast action. Two 19½-in. diameter by five-inch-wide Rotoblast wheels, each powered by a 40 hp motor, throw approximately 100,000 lbs of steel shot abrasive per hour.

At the discharge end, the load is tumbled thoroughly to remove all abrasive, which is returned to the reclamation system for reuse. New abrasive can be added while the machine is running.

Trays Protect Machined Parts

FLEXIBLE wooden trays simplify inventory and provide protection of parts from the first machine operation to completion at the Sundstrand Aviation plant in Rockford, Illinois. Designed and manufactured by Albert Wesling & Sons, Inc., the tray system has been in use for over four years.

At present, over 6000 trays of all types are used to accommodate hundreds of different parts. Two men handle the scheduling, cleaning, storing and conversion of the trays.

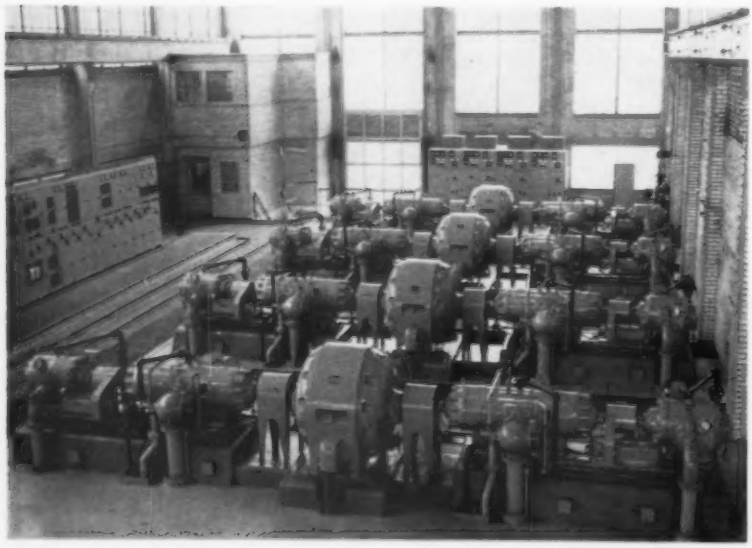
Production control cards accompany each lot of parts throughout their manufacture, until they go into stock. Tray configurations and quantities are determined from the production card and trays are scheduled for the proper machine at the right time.

Conservation of floor space is

(Continued on page 58)

Duplex Compressor Layout Saves Space, Reduces Number of Motors and Control

ECONOMICAL use of space and equipment are features of this air compressor plant installed at the New Jersey refinery of a large eastern oil company. A duplex system, it consists of eight two-stage Fuller rotary air compressors hooked up in pairs and direct-driven by four 700 hp motors.



Double shaft motors drive two compressors each to save space and reduce costs.

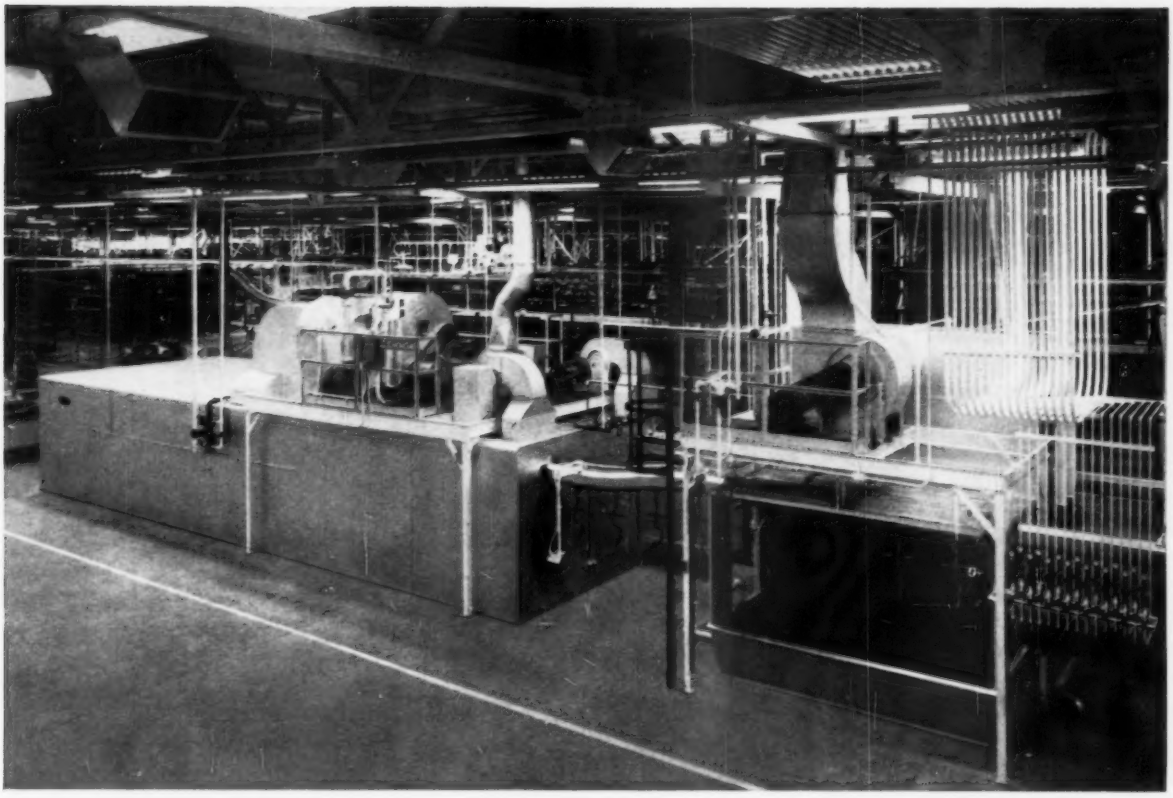
Ordinarily, each of the 1664-cfm units would have its own power source. In this case, space was conserved by connecting two units to a common motor through flexible couplings.

Supplying the refinery air load of 13,200 cfm, the duplexes compress air from atmosphere to 115 psi for tools, machinery, air lines and other uses. Operation is automatically controlled and the units are lubricated by force-feed systems.

For exceptional air demands, an additional 4800 cfm of air is available from reciprocating compressors on standby, raising total plant capacity to 18,000 cfm.

Located over a basement area, all air piping, water cooling and electrical conduits come up through the floor next to the equipment.

FINISHING SYSTEMS...



for Miscellaneous Parts in Various Colors!

The Spray Booth and Finish Baking Oven illustrated above handle the Finishing Operations on a group of small parts . . . this equipment is part of a large Mahon installation that provides cleaning, rust proofing, painting and finish baking facilities for all items produced in a large automobile parts plant.

If you have a finishing problem, or are contemplating new finishing equipment, you, too, will want to discuss methods, equipment requirements and possible production layouts with Mahon engineers . . . you'll find them better qualified to advise you, and better qualified to do the initial planning and engineering which is so important in the specially designed equipment of a modern, properly coordinated production finishing system.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

SALES-ENGINEERING OFFICES in DETROIT, NEW YORK and CHICAGO

Engineers and Manufacturers of Complete Conveyorized Finishing Systems; Metal Parts Washers, Metal Cleaning and Rust Proofing Machines, Conveyorized Cleaning and Pickling Machines; Dry-Off Ovens, Cooling Tunnels, Spray Booths, Electrostatic Spray Enclosures, Flow Coaters, Dip Coaters, Finish Baking Ovens, and Paint Stripping Equipment; Core Ovens, Soldering Ovens, Heat Treating and Quenching Equipment for Aluminum and Magnesium; Dust and Fume Control Installations, and Many Other Units of Special Plant and Production Processing Equipment.

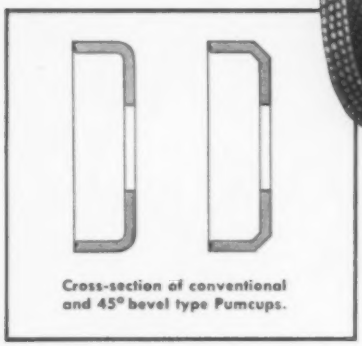
See Sweet's Plant Engineering File for Information and Representative Installations, or Write for Catalogue A-659

. . . the **EXPERIENCE** that goes into the **PLANNING** and **ENGINEERING** of **MAHON EQUIPMENT** is the item of **GREATEST VALUE to YOU!**

MAHON

For more facts circle 539 on Reply Card

2-way gain with Pumcups



Cross-section of conventional and 45° bevel type Pumcups.

Darcova Pumcups are available in various types and textures, in a complete range of sizes, to provide unequalled efficiency and long life in reciprocating pumps, air or hydraulic mechanisms.

★ prolonged high efficiency
★ less maintenance

TODAY hundreds of companies using hydraulic controls, air cylinders or reciprocating pumps are *standardizing* on Darcova Pumcups for piston packing, because they eliminate fluid slippage, costly down-time and maintenance.

Darcova Pumcups make the *most* of the cup packing principle. And, they are made in a complete range of sizes, types and texture-engineered compositions for various pressure-temperature-fluid conditions. Pumcups hold peak efficiency for the life of the cups and outlast other packing as much as 3 to 1.

Why not check these claims right in your own plant? Meanwhile get *all* the facts. Just send for Pumcup Bulletin No. 5503.

DARLING VALVE & MANUFACTURING CO.
Williamsport 14, Pa.

DARCOVA — THE ORIGINAL COMPOSITION CUP

TRADE MARK PUMCUPS

For more facts circle 540 on Reply Card

OPERATION — PRODUCTION

(O and P begins on page 54)

Variety of parts are handled in the trays by re-arranging dowel dividers.

an important attribute of the trays and convenience of mobility has been added by the use of wheeled racks. At the completion of a production order, the parts are put into stock and the trays are returned to the tray room for cleaning. They are either used again in the same configuration or converted to handle different parts and put back into use.

Vibration Aids Formula Mixing

CONTINUOUS mixing of dry ingredients, at feeding rates of from one to 50 lb per minute, has simplified preparation of poultry, dairy and hog feeds at Red Comb Pioneer Mills, Inc., Wilmington, Delaware. Closely controlled mix-

Vibrating feeders and controls. Rate of feed is set by knob on control panel.

For more facts circle 541 on Reply Card ——→

Positive Protection Against Phase Failure and Phase Reversal ?

Here is your answer!

The Allen-Bradley Bulletin 812 Type F, Type R, and Type RF relays provide positive protection against the hazards to men, motors, and driven machinery, resulting from phase failure and/or phase reversals.

The Bulletin 812 Style F phase failure relay employs a unique static sensing network that responds to all open phase conditions on a motor branch circuit and immediately removes the motor from the line . . . irrespective of the load on the motor (including no load), or the circuit arrangement. This relay even responds to hard-to-detect primary failures on a wye-delta transformer with ungrounded neutral. Furthermore, the five-cycle response prevents nuisance "drop-outs" from transient fluctuations.

The Bulletin 812 Style R phase reversal relay disconnects the motor from the line—whether it is running or not—when a phase reversal occurs anywhere in the system on the line side of the relay. Thus, it can be employed for a single motor, a group of motors, or an entire power system. In addition, the phase reversal relay prevents the motor from starting should phase failure occur while at a standstill—a vital feature for elevator applications.

The Bulletin 812 Style RF relay combines the elements of Style R and Style F relays for protection against both phase failure and phase reversal. All Bulletin 812 relays are inherently "fail safe." Send for complete information.

Allen-Bradley Co., 1316 S. Second St.
Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd.
Galt, Ont.

ALLEN-BRADLEY
QUALITY
MOTOR CONTROL

12-58-MR

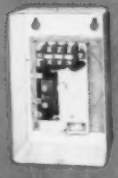
Bulletin 812, Style RF
for Phase Failure
and Phase Reversal

INDIVIDUAL RELAY UNITS AVAILABLE

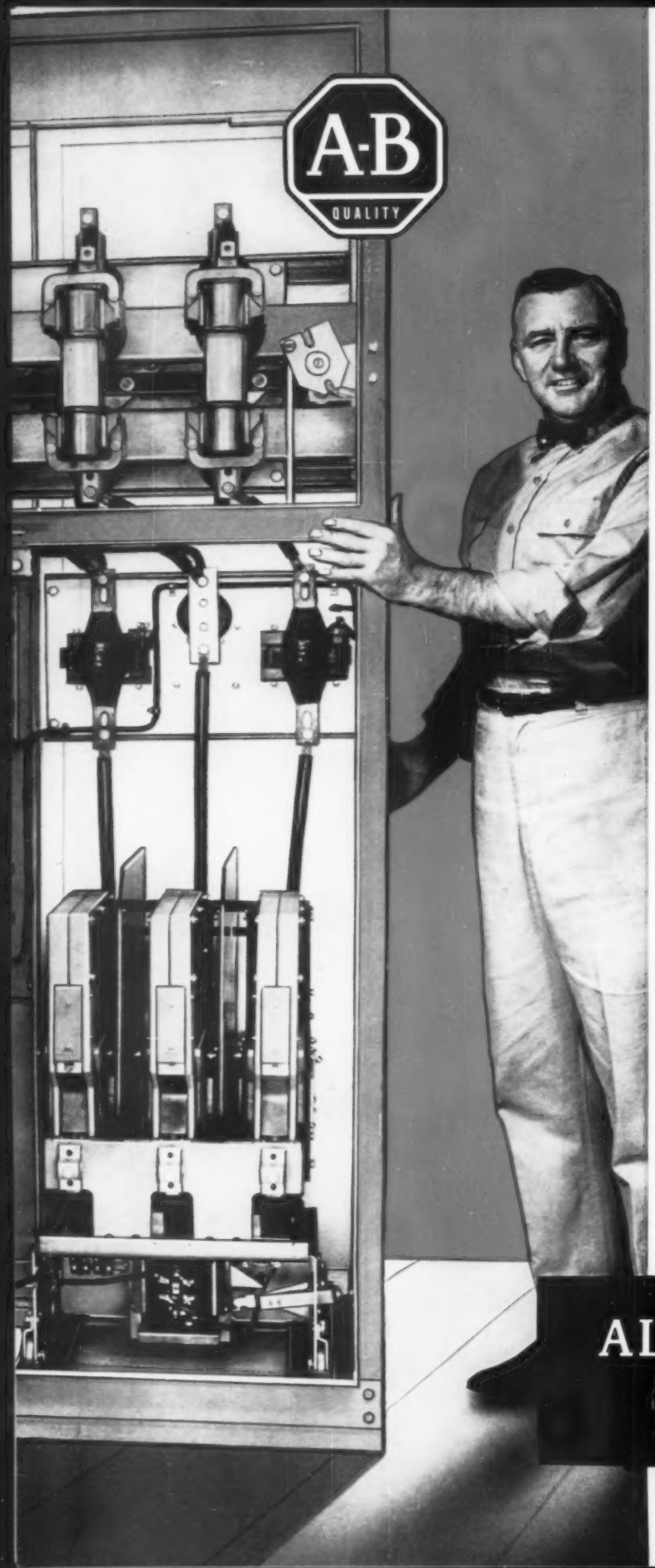
For Phase Failure

Style F covers full load currents from 1.5 to 300 amp in 4 sizes. Coils for up to 600 v, 60 cycles.

For Phase Reversal



Style R made with coils for 110, 208/220, 440, 550 v for either 50 or 60 cycle operation.

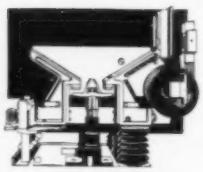


Tough high-voltage job?...Here's the answer!

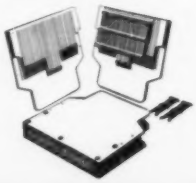
Allen-Bradley High-Voltage Air Break Starters are ideal for frequent switching, reversing, plugging, or jogging.

A tremendous operating life has been built into these high-voltage air break starters . . . resulting from the use of the simple solenoid contactor. It's the same design—having only ONE moving part—that provides millions of trouble free operations in Allen-Bradley's low-voltage controls. These starters are made in a complete line for all types of service. Send for Publication 6080, today.

ONLY ONE MOVING PART
With this simple solenoid design, all trouble causing pivots, pins, and flexible jumpers are eliminated. Straight up-and-down motion of contactor is virtually frictionless.



DOUBLE BREAK CONTACTS
Allen-Bradley silver alloy contacts never need maintenance . . . they remain in perfect operating condition until completely worn away. Vertical motion assures uniform contact pressures at all times.



FASTER ARC SUPPRESSION
The air break contactor employs a completely different blowout design and novel arc chute which assure rapid arc extinction. Chutes are molded from arc resistant material.

ALLEN-BRADLEY
MOTOR CONTROL
QUALITY

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

12-58-M

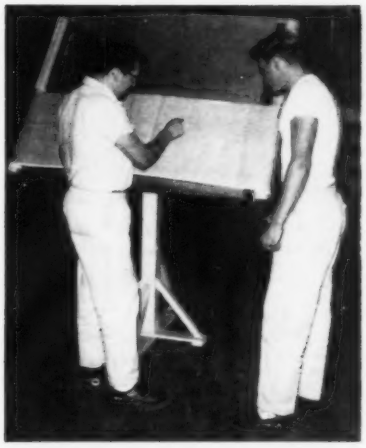
(O and P begins on page 54)

ing on a production line basis has been accomplished with the installation of vibrating feeders.

Prior to the installation of the feeders, products of Eriez Manufacturing Company, all materials for the feeds were delivered to the plant in 100-lb bags. These bags had to be opened and their contents premixed according to formula for each type of feed.

Installation of the automatic feeders now permits the delivery of ingredients in carload lots which are emptied in bulk bins. These ingredients are then accurately fed into a continuous line-mixing operation at controlled rates.

Timesaving Blueprint Holder

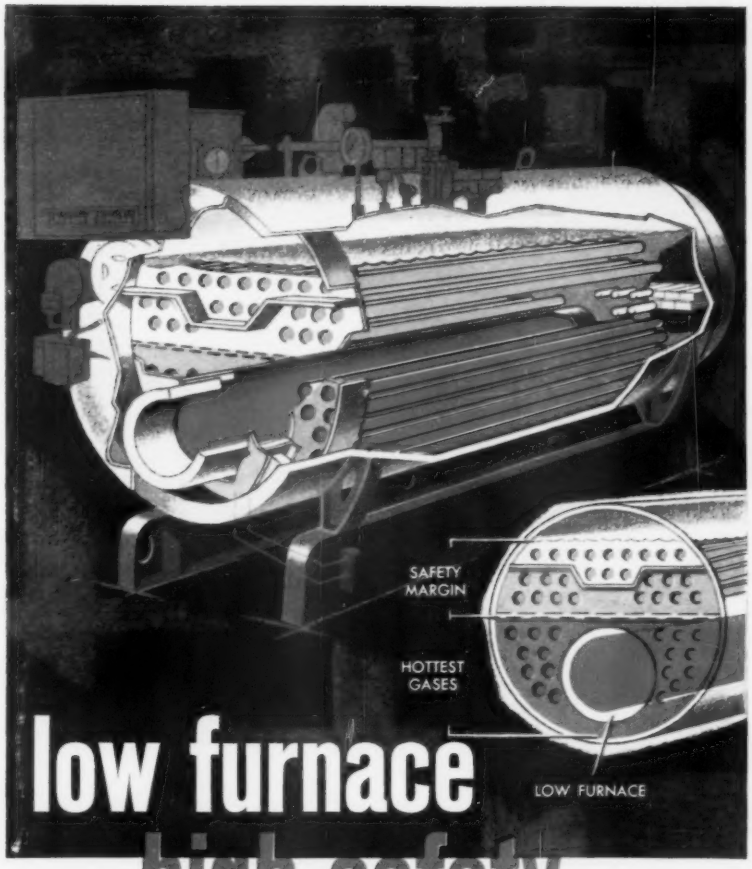


Designed by plant engineering staff, Douglas Aircraft Company, Long Beach, California, these blueprint holders are used with lengthy blueprints. Needed information is kept readily available and this method reduces handling which smudges prints.

Air Gap Cleans Metal Caps

INSTALLATION of a magnetic pulley is serving several important functions simultaneously at Continental Can Company's White Cap & Bond Crown Division plant located in Wilmington, Del.

When the metal caps are completed they are conveyed on a mesh conveyor to the packaging equipment. As the caps reach the end of the mesh conveyor, they



low furnace
high safety

Cleaver-Brooks updraft design keeps hottest gases low in the boiler. Greater safety and drier steam

UPDRAFT CONSTRUCTION — with low furnace — in Cleaver-Brooks boilers provides greatest margin of operating safety. Hottest gases are low in boiler . . . for greatest submergence. The 4th pass of gas travel — with low temperature gas — is closest to normal water level. This means greatest safety in case water level drops. Updraft construction is one of the four DESIGN STANDARDS that make Cleaver-Brooks your best packaged boiler buy.

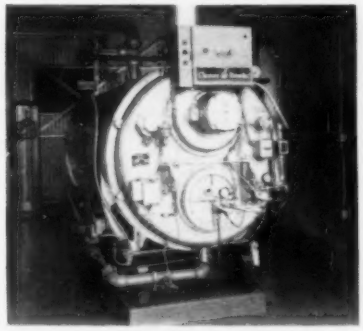
4-PASS FIRE TUBE DESIGN maintains high flue-gas velocity to provide optimum heat transfer for low cost steam or hot water.

FORCED DRAFT — supplies controlled quantities of cool, clean boiler room air. Cleaver-Brooks design assures proper air fuel ratios necessary for complete combustion. Eliminates high chimney.

5 SQ. FT. OF HEAT TRANSFER SURFACE — for each boiler hp is the greatest amount offered in any packaged boiler. It's your assurance of longer boiler life, lower fuel costs, less boiler maintenance.

This exclusive combination of DESIGN STANDARDS is the basic reason for the clear superiority of Cleaver-Brooks packaged boilers, 15 to 600 hp; 19 sizes, 130 models; steam or hot water; oil, gas or combination oil/gas fired.

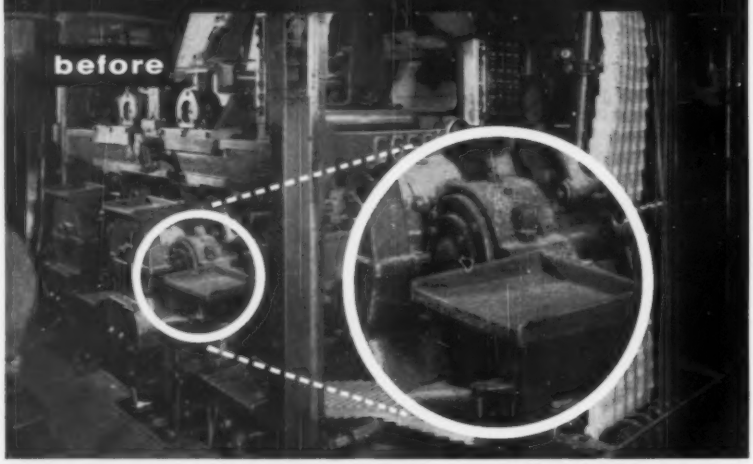
For detailed data, write Cleaver-Brooks Company, Dept. P, 364 E. Keefe Ave., Milwaukee 12, Wis.

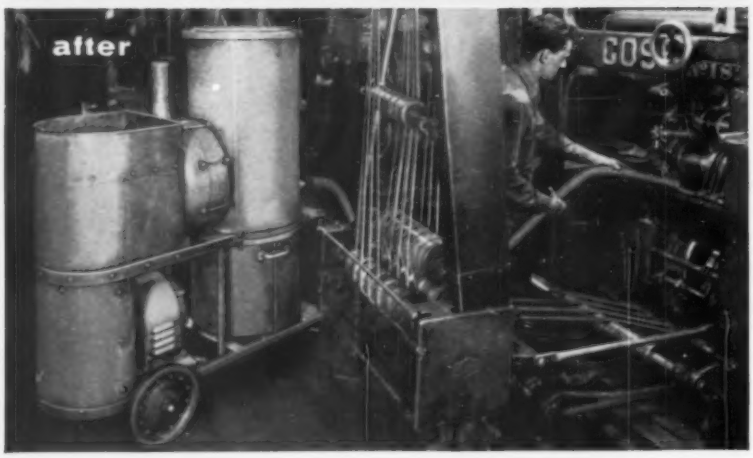


Cleaver Brooks®
ORIGINATOR AND LARGEST PRODUCER OF PACKAGED BOILERS

For more facts circle 542 on Reply Card

INVINCIBLE VACUUM UNITS
Keep Press Rooms Dust-Free





Powerful Invincibles do a thorough job of cleaning newsprint particles and dust from newspaper folders after each day's press run. They prevent dust from impairing operation of folders and from clogging ink fountains on presses. They clean a folder in only 45 minutes. The unit pictured has been in daily use for 10 years; only maintenance has been replacement of vacuum hose. Unlike compressed air, Invincibles *collect* dust, prevent spread, permit easy disposal. Compact and portable, Invincibles can also be used for general maintenance everywhere in plant or office.

Check the Many Uses for Invincibles

Invincibles handle almost any material—liquid or solid—that can pass through a vacuum hose. They cost little, last for years. In 22 models from ½ to 7½ H.P.—the most complete line of heavy-duty industrial vacuum equipment. Resident engineers in all principal cities.

WRITE FOR BOOKLET—it tells about the many materials reclaimed or removed.

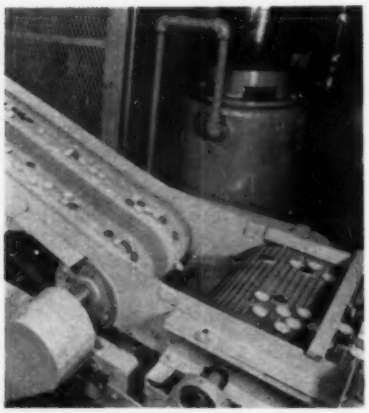
INVINCIBLE VACUUM CLEANER MFG. CO.
DOVER, OHIO

For more facts circle 543 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 54)

slide down an apron and are instantly picked up by the magnetic fields of the Alnico V elements encased within the pulley. The magnets in the pulley, furnished by Eriez Manufacturing Company, are arranged to align the caps in two rows which are conveyed by the belt to be automatically counted and packaged.



Magnetic pulley separates the finished bottle caps from small bits of cork by pulling them across a small air gap.

The metal caps are attracted to the pulley across a small air gap at the bottom of the apron. All non-magnetic particles drop freely through this gap insuring that nothing but the caps reach the final packaging operation.

Carbide Tipped Saws Save $3500

THREE carbide tipped saws have made more than 55,000 cuts through tough 85-15 architectural bronze at the Flour City Ornamental Iron Co., Minneapolis, without need for resharpening. This performance represents a saving of some $3500 in saw resharpening and an increase in time between grinding of blades of 70 to one over equipment previously used.

The three saws, manufactured by Lemmon and Snoap Co., Grand Rapids, Michigan, and tipped with Carboloy cemented carbide have helped to solve the problem associated with cutting this tough material. Both 18-in. and 16-in.

Control Cable Savings Begin with Small Diameters

For New Work or Rewiring...

SPECIFY & BUY
ROCKBESTOS
PNR
600 VOLT CONTROL CABLE

PNR — Polyethylene • Nylon • Rockhide (PVC)

HERE'S THE PROOF WHEN IT COMES TO CONDUIT FILL

No. 12 A.W.G. (19/25) COND. SIZE		1 CABLE PER CONDUIT				2 CABLES PER CONDUIT				3 CABLES PER CONDUIT				4 CABLES PER CONDUIT			
		Max. Cable Dia." Table 11 N.E.C.	Number of Conductors in one Cable ROCK PNR	3/64"	4/64"	Max. Cable Dia." Table 11 N.E.C.	Number of Conductors in one Cable ROCK PNR	3/64"	4/64"	Max. Cable Dia." Table 11 N.E.C.	Number of Conductors in one Cable ROCK PNR	3/64"	4/64"	Max. Cable Dia." Table 11 N.E.C.	Number of Conductors in one Cable ROCK PNR	3/64"	4/64"
½"	New Work	.450	2-4			.243				.234				.195			
	Rewiring	.479	2-4			.276				.252				.218			
¾"	New Work	.598	5-7	2-3		.323				.311				.260			
	Rewiring	.636	5-8	2-4	2	.367				.335				.290			
1"	New Work	.762	8-14	4-7	2-4	.412	2-3			.396	2						
	Rewiring	.811	9-16	5-8	3-5	.468	2-4			.427	2-3						
1¼"	New Work	1.000	15-19	8-12	5-8	.543	4-5	2-3		.523	3-5	2-3					
	Rewiring	1.070	17-19	9-16	6-9	.618	5-8	2-4		.564	4-5	2-3					
1½"	New Work	1.170		13-19	9-12	.634	6-8	4	2	.610	6-7	4					
	Rewiring	1.248			10-14	.721	9-11	5-7	2-4	.658	6-9	4-5	2				

This is an excerpt from the Rockbestos Control Cable Conduit Fill Chart covering sizes A. W. G. 9, 12, 14. Write today for your free copy. Ask for PNR 1-58.

ROCKBESTOS PRODUCTS CORPORATION, NEW HAVEN 4, CONNECTICUT

NEW YORK • CLEVELAND • DETROIT • CHICAGO • PITTSBURGH • ST. LOUIS • ATLANTA • DALLAS
SEATTLE • LOS ANGELES • BURLINGAME, CALIFORNIA

ROCKBESTOS

PNR
Small Diameter Control Cable

MORE THAN 16,000,000 FEET IN SERVICE

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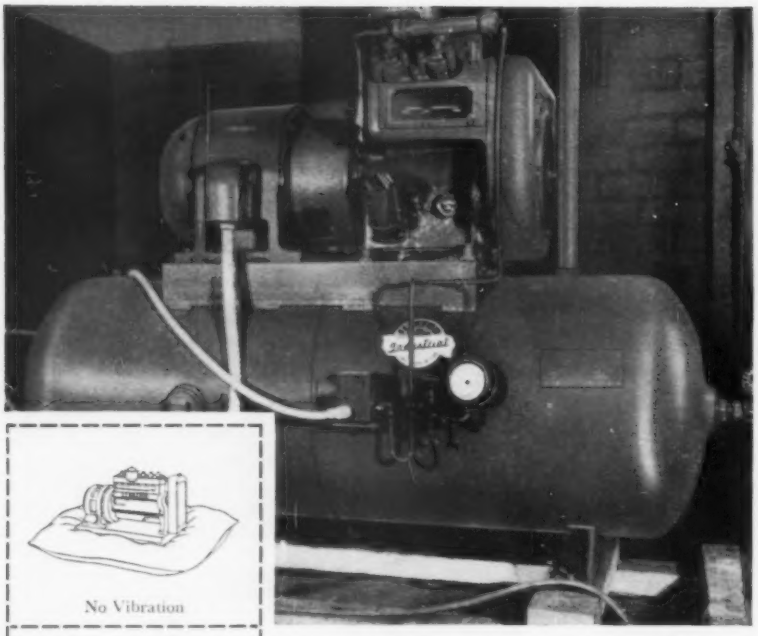
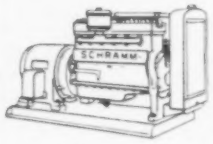


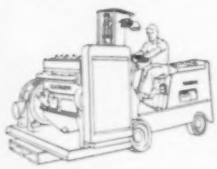
No Vibration



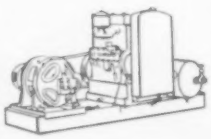
Compact

Unit System

No Elaborate Foundations



Easy to move



Complete Package

NO VIBRATION!

Schramm vibration-free compressors eliminate costly foundations

Balanced reciprocating parts will give vibrationless operation, lengthen compressor life. Any floor space will serve as a base—no need for special foundations. Schramm compressors don't even have to be fastened to the floor! And they're easier on your building, too.

Easy to move—change the location of your compressor whenever you need. Complete Package—all you need for your air requirements in a single package.

No elaborate foundation—eliminate this added cost with a vibration-free Schramm installation.

Compact—takes less space—put your Schramm compressor anywhere—take advantage of unused corners.

Unit System—use only as many compressors as you need now, expand your installation as required.

For complete information, write for Catalogs GC-57 and 5510, or see your nearest Schramm Dealer.

See the Yellow Pages for local Sales, Service and Rental of Schramm Air Compressors.

Schramm, Inc.

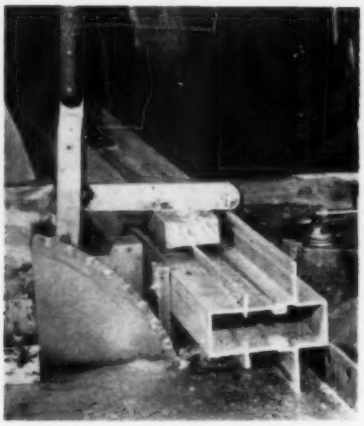
MANUFACTURERS OF AIR COMPRESSORS

665 North Garfield Ave. • West Chester, Pa.

For more facts circle 545 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 54)



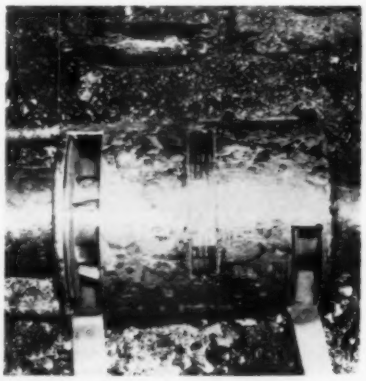
Solid disc saw has cemented carbide teeth spaced close together, no gullet.

saws run at 3400 rpm and have logged 21,000 cuts each. A 10-in. saw, running at 3000 rpm has logged 14,000 cuts and is the only one of the three needing resharpening.

Expansion Joint Solves Buried Steam Line Problem

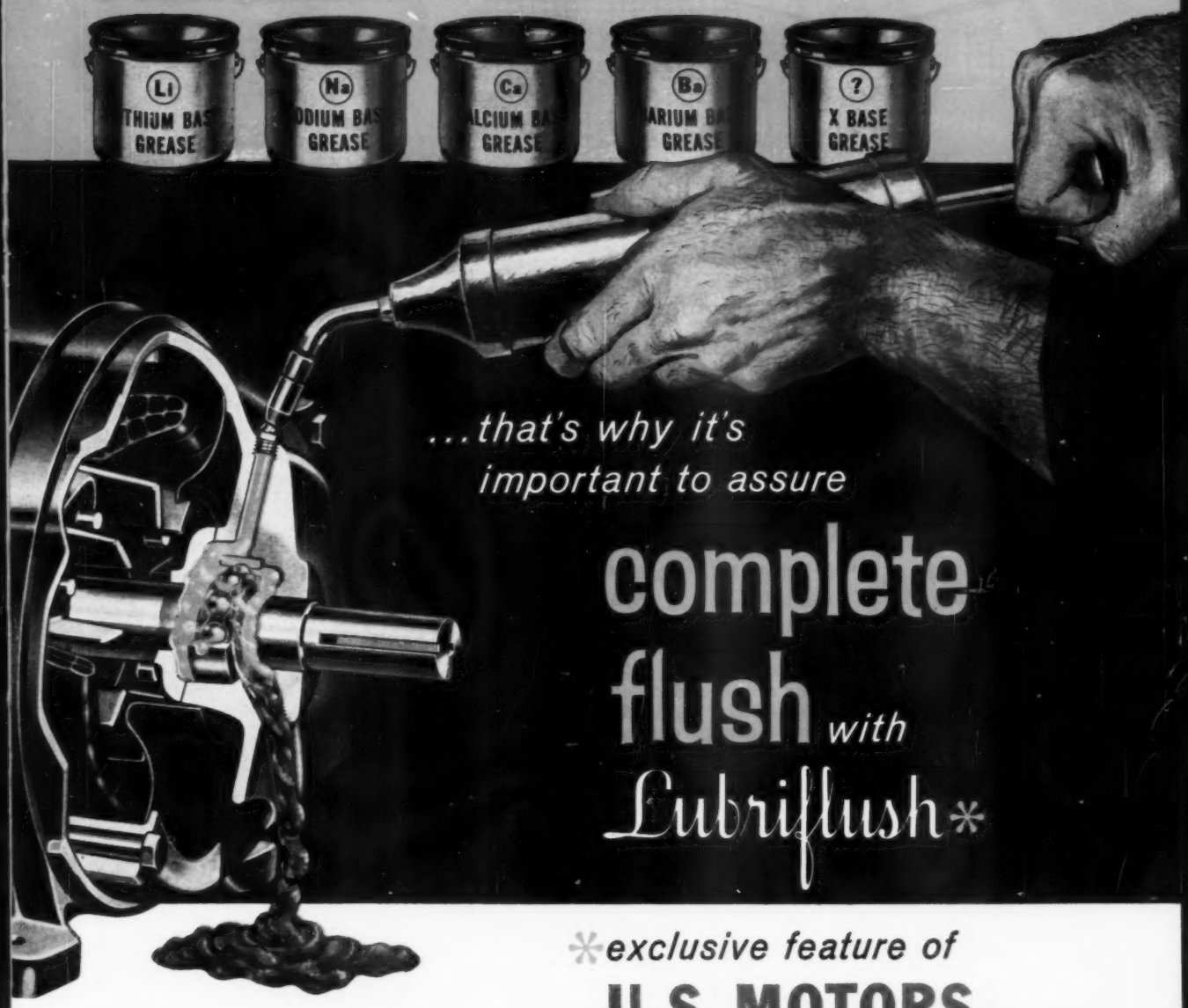
BASED on the results of an eight-month service test, a new method of constructing underground steam lines promises savings up to 50 per cent.

Announced jointly by Consumers Power Company, Jackson, Michigan, and Badger Manufacturing Company, the new pipe laying and insulating system eliminates previous need for concrete.



Expansion fitting, opened after eight months service, shows clean interior.

modern greases are not always compatible...



...that's why it's important to assure

complete flush *with* Lubriflush*

**exclusive feature of*

U.S. MOTORS

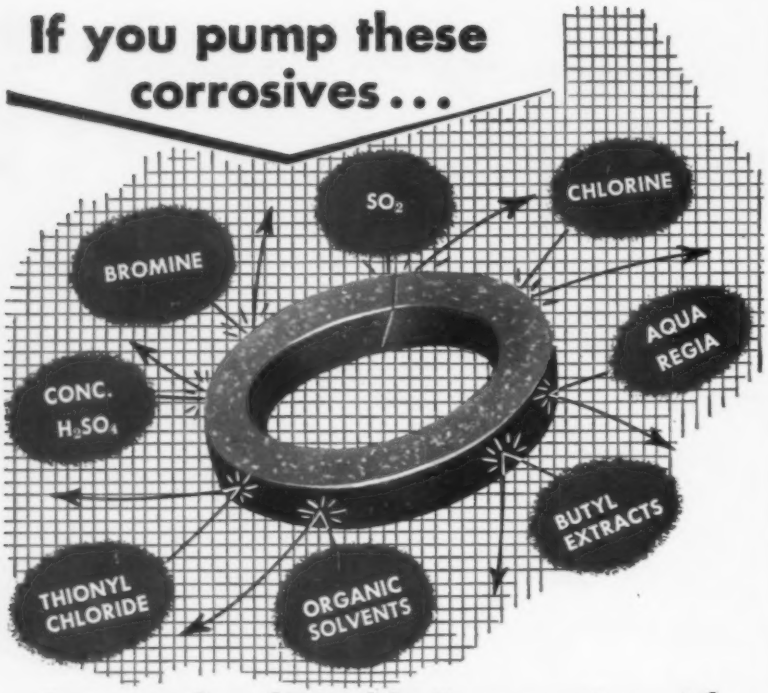
Today's greases have different chemical bases—lithium, sodium, calcium, barium, and other bases which your people can't be expected to keep track of. Some of these greases will not mix safely with others. Because certain chemical bases may react with each other, mixed grease may change its characteristics and become unsuitable for bearing lubrication. That is why U.S. LUBRIFLUSH—an exclusive feature of U.S. Motors—is so important. With this transverse lubrication system, old grease is *completely* flushed out as new grease is forced in. There's no mixing. New grease can be put in without bothering to determine whether it's basically compatible with the old. LUBRIFLUSH, moreover, assures proper lubrication for longest bearing life. Another good reason to specify: "U.S. ELECTRICAL MOTORS."

U.S. ELECTRICAL MOTORS INC.

P. O. BOX 2058, LOS ANGELES 54, CALIFORNIA
OR MILFORD, CONNECTICUT

FREE COLOR BROCHURE
...for full information send for FREE Lubriflush Bulletin.

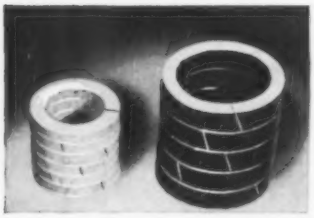
For more facts circle 546 on Reply Card



Get months of Trouble-Free service with

CHEMPRO TEFLON PACKINGS

If your pumps and valves handle highly corrosive industrial chemicals, CHEMPRO TEFLON PACKINGS will drastically cut packing replacement and maintenance costs. CHEMPRO Packings *last for many months* under corrosive conditions which make ordinary packings useless in days or even hours. They stop leakage by providing a tight seal at only slight gland pressure, and their very low coefficient of friction often makes lubrication unnecessary.



TEFLON* PLASTIC STUFFING BOX PACKING

Ideal for either centrifugal or reciprocating pumps operating at speeds up to 3600 R.P.M. handling corrosives at temperatures from -118° F. to 525° F. Style No. 101 composed of 94% shredded Teflon and chemically inert graphite as a friction reducer. Style No. 201 same as No. 101 except that mica is used as friction reducer. Both styles made to fit every size stuffing box on standard process equipment.

TEFLON V-TYPE PACKINGS

For reciprocating pumps and hand, air and motor operated valves handling corrosive materials. Lips of very sensitive pressure rings expand proportionately to increased operating pressure thereby preventing leakage. Suitable for temperatures from -150° F. to 550° F. Unsuitable for centrifugal or rotary pumps. Supplied in bulk or in complete sets to fit specific stuffing boxes.

Chemical & Power Products engineers are packing and gasket specialists with complete fabricating facilities to meet your specific requirements. Write for our complete Teflon Packing and Gasket Catalog.

*du Pont Trademark

CHEMICAL & POWER PRODUCTS, INC.

The Original Fabricators of Teflon Packings and Gaskets

7 Broadway, New York 4, N.Y.

For more facts circle 547 on Reply Card

OPERATION — PRODUCTION

(O and P begins on page 54)

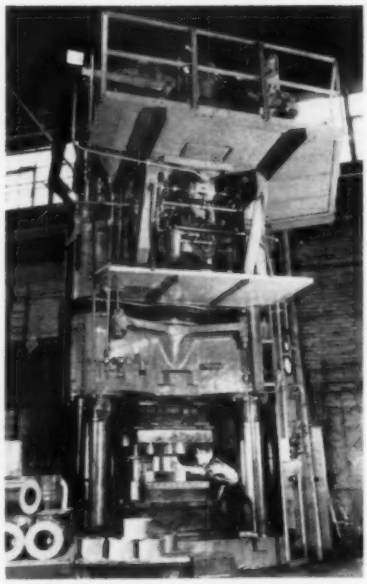
conduit and man holes in the line.

Pipe, including expansion joints and other fittings, is laid in a trench; anchors, guides and supports are installed; then the line is packed with granular poured-in-place hydrocarbon insulation and covered. As the line is heated, the insulation cures to a three-layer protective and insulating covering.

The layers range in form from plastic, where it is in contact with the line, through a sintered consistency in the middle layer, to loose granules on the outer layer.

Previous designs of underground lines installed encountered operating trouble due to loose granules interfering with the operation of the expansion fittings. Test results indicate that the Badger expansion joint has satisfactorily solved this problem. The cover provides complete protection against damage from loose insulation granules.

Powder Metal Press Forms 30-Inch Diameter Parts



Installation of 3000-ton capacity press now makes it possible for the Amplex Division, Chrysler Corporation, to produce powder metal parts up to 30-in. diameter. Press will be used to produce giant self-lubricating bearings and wear plates and other jumbo-size parts.

Now's the time to prevent freezing of heater coils... with Production Planned steam trapping

By John W. Ritter, Test Engineer, SARCO Company, Inc.

Freezing of heating coils usually takes place when outside air temperature is slightly below the freezing point, and it is most common in coils that have the steam supply controlled by a temperature regulator which keeps the outlet air temperature constant. Freezing can occur only when the coil becomes water-logged, and in this case the steam trap is often blamed for the trouble.

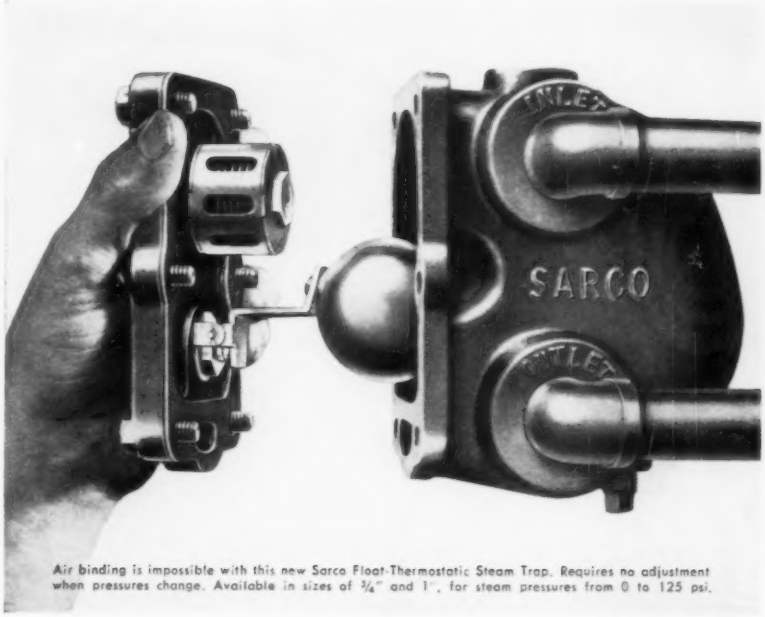
The discharge capacity of any steam trap depends upon the difference in pressure between the trap inlet and its outlet. If there is no pressure difference, the trap cannot remove condensate; and if inlet pressure is lower than outlet pressure, condensate will be held back in the coil.

There are three ways to avoid this difficulty. First, a pressure controlled bypass can be arranged around the temperature control valve to prevent heater pressure from falling below a preset minimum. This plan would make the temperature controller ineffective over part of the range of outside air temperature.

A better solution is to install the steam trap well below the unit, and thus provide a hydraulic leg to enable the trap to discharge even with a vacuum in the steam space. An ample sized vacuum breaker should be installed at the top of the steam inlet of the heater.

To compute the hydraulic head needed, use a figure of 3′ per 1 psi pressure differential. For example, if the trap has the required capacity at 1 psi differential, the minimum head will be 3′.

Thirdly, on new construction, the preheater can be divided into two sections. The first should be capable of raising the air to at least 32° under minimum outside air conditions. The second section should raise the air from 32° to the final temperature. Full steam is supplied to the first coil at all times, while the second is controlled to maintain the final temperature needed. The first coil will not freeze because of the maintained pressure, nor will the second, because minimum air temperature is always above 32°.



Air binding is impossible with this new Sarco Float-Thermostatic Steam Trap. Requires no adjustment when pressures change. Available in sizes of ¾" and 1", for steam pressures from 0 to 125 psi.

A SARCO F-T Steam Trap will drain condensate completely

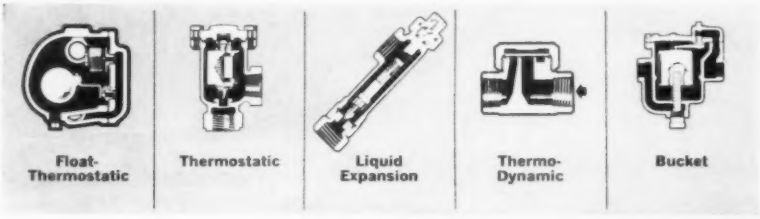
Count on the Sarco Float-Thermostatic Steam Trap to discharge condensate practically at steam temperature, continuously and without shock. Sarco F-T's do not cause pressure fluctuation while discharging.

For *production planned* trapping of heating coils, with accurate temperature control, use the new Sarco Steam Trap Type F-T.

Write for Technical Bulletin T502 on prevention of freezing in heater coils. You'll also receive a bulletin on Sarco F-T Steam Traps.

Remember that Sarco can give you *impartial* advice on steam trapping because only Sarco makes all 5 types.

5968-B



SARCO
COMPANY, INC.
635 Madison Ave., New York 22, N. Y.

Only Sarco makes all 5 types:
Thermostatic • Liquid Expansion • Float Thermostatic
Thermo-Dynamic • Bucket

STEAM TRAPS • TEMPERATURE CONTROLLERS • STRAINERS • HEATING SPECIALTIES

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POWELL

world's largest family of valves

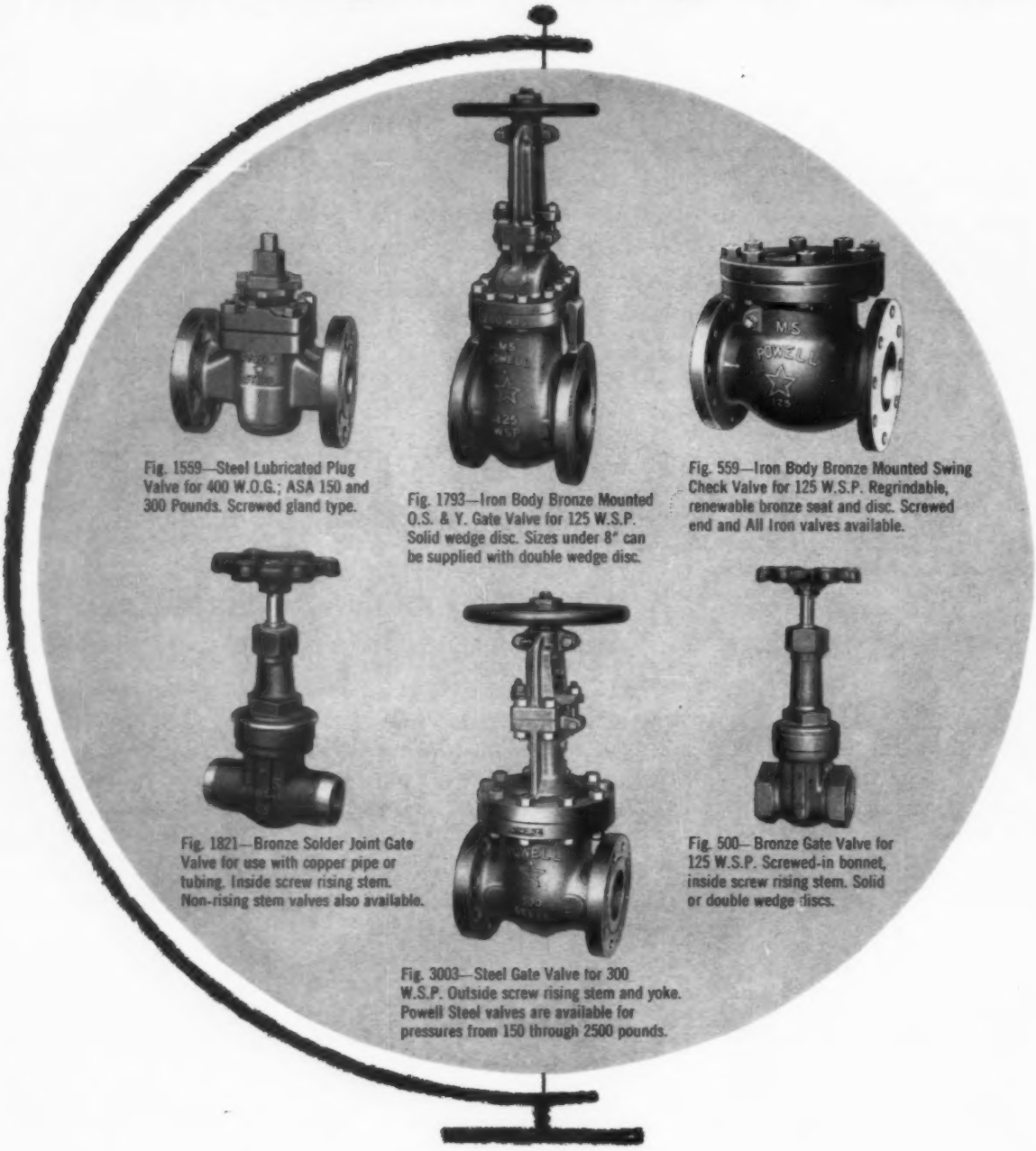

Fig. 1559—Steel Lubricated Plug Valve for 400 W.O.G.; ASA 150 and 300 Pounds. Screwed gland type.

Fig. 1793—Iron Body Bronze Mounted O.S. & Y. Gate Valve for 125 W.S.P. Solid wedge disc. Sizes under 8" can be supplied with double wedge disc.

Fig. 559—Iron Body Bronze Mounted Swing Check Valve for 125 W.S.P. Regrindable, renewable bronze seat and disc. Screwed end and All Iron valves available.

Fig. 1821—Bronze Solder Joint Gate Valve for use with copper pipe or tubing. Inside screw rising stem. Non-rising stem valves also available.

Fig. 3003—Steel Gate Valve for 300 W.S.P. Outside screw rising stem and yoke. Powell Steel valves are available for pressures from 150 through 2500 pounds.

Fig. 500—Bronze Gate Valve for 125 W.S.P. Screwed-in bonnet, inside screw rising stem. Solid or double wedge discs.

FOR EVERY FLOW CONTROL PROBLEM Powell offers more kinds or types of valves, available in the largest variety of metals and alloys, to handle every flow control requirement. Your local valve distributor will be glad to tell you all about them. Or write to us for the full facts.

THE WM. POWELL COMPANY • *Dependable Valves Since 1846* • **Cincinnati 22, Ohio**

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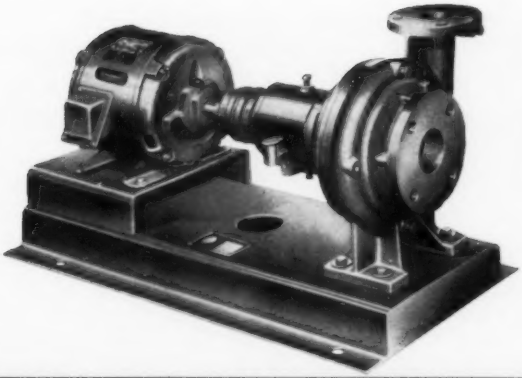
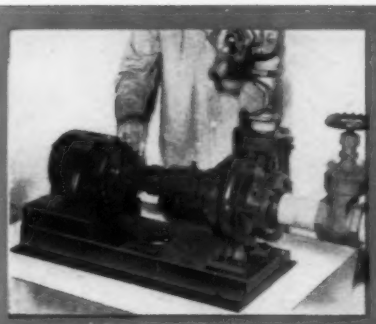


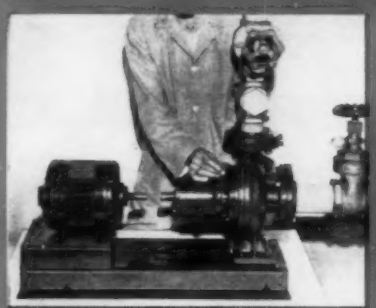
EASY TO SERVICE THIS VERTICAL SPLIT-CASE PUMP

B&G SERIES 1510-B CENTRIFUGAL PUMP

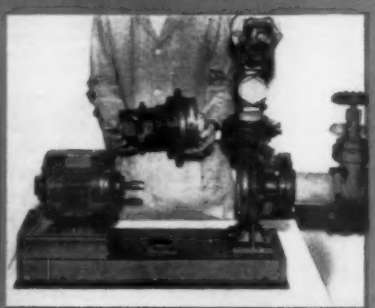


1. Loosen coupler set screw

2. Slide coupler off motor and pump shafts



3. Remove volute cover cap screws



4. Lift out complete bearing frame assembly

The photos show how easily the complete bearing frame, including seal and impeller, can be removed without disturbing piping or motor leads. The unit is replaceable and interchangeable in all pump sizes within limits of material construction.

Other features of the 1510-B include—

Mechanically balanced impeller. Balancing chamber and pressure relief holes in the impeller reduce thrust to a minimum, lengthening pump life.

Solid-type volute with support foot. Can be left in pipe line when servicing pump—rugged construction absorbs piping strains.

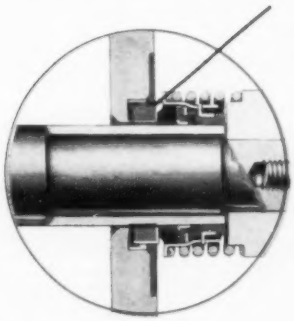
Anti-friction roller bearings. Timken bearings handle thrust and radial loads for smoother, quieter, more efficient operation.

Oil lubrication. No messy, undependable grease cups—circulating oil lubrication assures positive protection to bearings. Oil level indicator permits visual check.

Rugged steel base. Base mounted construction provides a sturdy platform for proper pump and motor alignment.

100% factory tested. Every pump hydraulically tested to meet specified conditions of head and capacity.

Capacities. To 1100 GPM, heads to 420 ft.



LEAK-PROOF "REMITE" SEAL

This exclusive feature assures long, trouble-free life—eliminates the customary leakage which occurs when a packing gland is used. A carbon seal ring faces on a "Remite" floating seat—a material developed by B&G, so hard it will scratch glass—wear-proof and corrosion-resistant.

This mechanical seal is self-lubricating. A synthetic rubber bellows seals the shaft. Metal parts are of steel, bronze or stainless steel, depending upon the type of service.

STOCK PUMPS FOR QUICK SERVICE

Selected sizes of B&G Series 1522, 1531 and 1510-B Centrifugal Pumps are stocked at the factory for immediate shipment. Capacities to 225 GPM, heads to 140 ft. Send for Price and Selection Catalog.

BELL & GOSSETT COMPANY

Dept. FN-53, Morton Grove, Ill.

Canadian Licensee: S. A. Armstrong Ltd., 1400 O'Connor Drive, Toronto 16, Ontario

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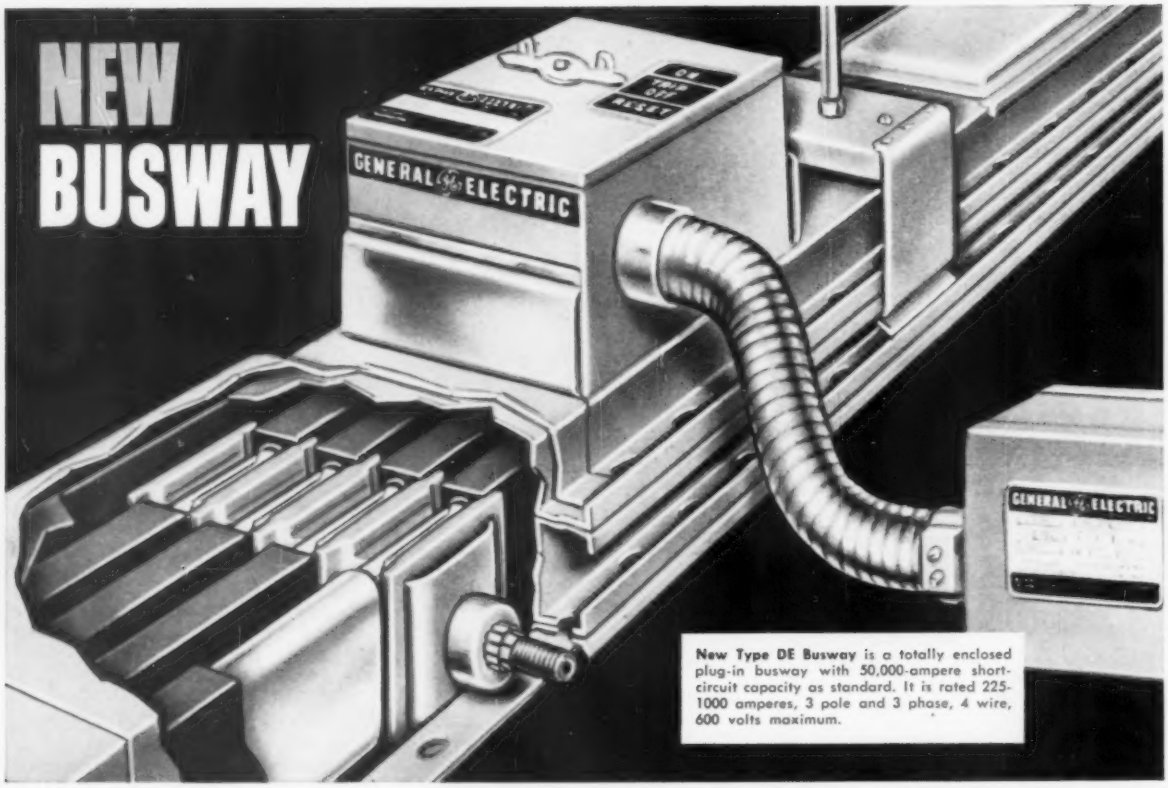
New idea offers more for the money...



New Type DE Busway is a totally enclosed plug-in busway with 50,000-ampere short-circuit capacity as standard. It is rated 225-1000 amperes, 3 pole and 3 phase, 4 wire, 600 volts maximum.

Ampere for ampere, the smallest, lightest, most efficient and rugged ever designed

With Type DE busway you get the very best for less. Although its cost, considering material alone, is slightly higher than conventional plug-in busway, DE will generally take one-third less time to install, bringing an overall first-cost saving of approximately 10%.

At the same time, DE busway will offer benefits no other system can provide, such as:

- **New Margins of Safety.** Butyl insulation is extruded over the full length of each bus bar, virtually eliminating traveling arcs and making each plug opening essentially "dead front."
- **Greater Flexibility.** A telescoping length eliminates need for exacting layouts. This, plus the feature that allows individual sections to be removed without disturbing adjacent sections, saves time, trouble and expense in new installations, system adjustments or change-overs.
- **Greater Efficiency.** DE offers lowest voltage drop available for plug-in busway of comparable rating. Requires virtually no maintenance. Unique one-bolt electrical joint maintains contact between adjacent silver-plated aluminum bus bars with a ton of force, minimizing resistance and adding to efficient operation.

In short, Type DE busway incorporates *all* 22 of the features engineers, contractors and users say are important in busway design.

See your G-E sales representative or distributor for full details. Ask for a copy of Bulletin GEA-6173. Or write to **General Electric Company, Distribution Assemblies Dept., Plainville, Conn.**

BUSWAY "BONUS FEATURE"

DE is approved for 10-foot mounting (in any position) instead of usual five. This, plus unique "snap-on" hangers, cuts installation cost sharply.

GENERAL ELECTRIC

For more facts circle 551 on Reply Card

CONSTRUCTION BRIEFS — a review of fundamentals for the plant engineer

Prepared by B. A. Wasil, Structural Engineer

DESIGNING IN REINFORCED CONCRETE PART VII

SINCE THE SLAB is poured monolithic with its beam in reinforced concrete, advantage can be taken of the flanges (the slab) in designing the beam as a tee-beam. In a simply supported beam, compression is on top and tension on the bottom. Where there is a tee-beam the flange is capable of withstanding a great deal of compression and thus the beam may be made shallow, just sufficient to handle shear.

The tee-beam may thus be considered as a rectangular beam where the flange may provide additional compression resistance in the same way as compression steel (see Part V).

However, most reinforced concrete structures have tee-beams that are continuous, rather than simply supported. This is the situation in the beam and slab system design begun in the last Brief. In a continuous beam there is negative moment over the supports and positive moment between supports.

The procedure for the design of the tee-beam will thus follow very closely the ideas developed in the design of doubly-reinforced beams.

Design of Tee-Beam

The governing data is shown in the previous Brief.

1. Loads

The tee-beam supports a panel 10 ft wide:

L.L.	= 150 × 10	=	1.5 kips/ft
D.L. (flange)	= 50 × 10	=	0.5 kips/ft
D.L. (stem) estimate		=	0.3 kips/ft
	Total	=	2.3 kips/ft

2. Shears

Again we are permitted to use simplified coefficients for moments and shears. If we assume the girders are 16 in. in width, then the clear span $l = 22.00 - (2 \times 0.667) = 20.67$ ft, and shear in end members at first interior support:

$$V = \frac{1.15\ wl'}{2} = \frac{1.15 \times 2.3 \times 20.67}{2} = 27.4 \text{ kips}$$

Shear at all other supports,

$$V = \frac{wl'}{2} = \frac{2.3 \times 20.67}{2} = 23.8 \text{ kips}$$

3. Moments

Positive moment at end span, if end is integral with the support:

$$M = \frac{1}{14}\ wl'^2 = \frac{1}{14} \times 2.3\,(20.67)^2 = 70.2 \text{ ft-kips}$$

Negative moment at exterior face of first interior support:

$$M = \frac{1}{10}\ wl'^2 = \frac{1}{10} \times 2.3\,(20.67)^2 = 98.3 \text{ ft-kips}$$

Positive moment, interior spans:

$$M = \frac{1}{16}\ wl'^2 = \frac{1}{16} \times 2.3\,(20.67)^2 = 61.4 \text{ ft-kips}$$

Negative moment at other interior supports:

$$M = \frac{1}{11}\ wl'^2 = \frac{1}{11} \times 2.3\,(20.67)^2 = 89.2 \text{ ft-kips}$$

4. Design for shear.

$$bd = \frac{V}{vj} \text{ (Design Equation)}$$

$$bd = \frac{27{,}400}{180 \times .866} = 176 \text{ sq in.}$$

use b (width of stem) = 12 in., d = 15 in.

bd = 180 sq in.

5. Check compression.

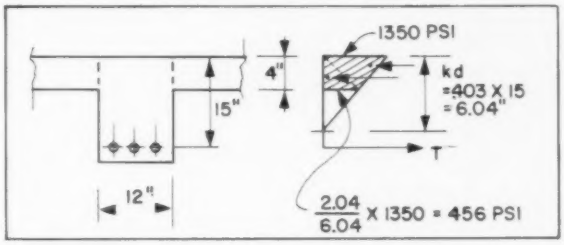
$M = Rbd^2$ (Design Equation)

Moment supplied by 12-in. × 15-in. rectangle:

$$M = \frac{236 \times 12 \times (15)^2}{12} = 53{,}100 \text{ ft-lb.}$$

Positive moment end span

Moment required	= 70,200 ft-lb
Moment supplied	= 53,100
Moment to be carried by 4-in. flange	= 17,100 ft-lb



Moment resistance of one inch of flange:

$$M = \frac{1350 \times 4}{2 \times 12} \times \left[15 - \frac{4}{3}\right] + \frac{456 \times 4}{2 \times 12}\left[15 - \frac{2}{3}4\right]$$

$= 4010$ ft-lb

therefore $\frac{17{,}100}{4010} = 4.27$ in. of flange is required to resist additional moment. The code allows the following use of the flange to resist moment:

a. Effective flange width not to exceed ¼ span length of beam, or $22 \times 12/4 = 66$ in.

b. Overhanging width on either side of web shall not exceed 8 times the slab thickness, or $8 \times 2 \times 4 = 64$ in.

c. Or ½ the clear distance between beams: $10 \times 12 - 12 = 108$ in.

Sixty-four inches are available and only 4.27 in. are needed; thus we see that the flange supplies much more width than is necessary.

The flange checks at the larger of the two positive moments and it is therefore not necessary to check the other.

Negative moment at exterior face of first interior support. For negative moments, we have to provide compression steel:

Moment required	= 98,300 ft-lb
Moment supplied	= 53,100
Moment to be supplied by compression steel	= 45,200 ft-lb

$$A'_s = \frac{M'Kd}{(2n-1)f_c(Kd-d')(d-d')}$$ (Design Equation)
assume $d' = 2\frac{1}{2}$ in.

Negative moment at other interior supports:

Moment required = 89,200 ft-lb
Moment supplied = 53,100
Moment to be supplied by compression steel = 36,100 ft-lb

$$A'_s = \frac{36{,}100}{45{,}200}\ (2.88) = 2.30 \text{ sq in.}$$

The numbers and sizes of compression steel members will be determined after the tension steel is designed.

6. Tension Steel

$$A_s = \frac{M}{f_s jd}$$ (Design Equation)

Bottom steel at end span:

$$A_s = \frac{70{,}200 \times 12}{20{,}000 \times .866 \times 15} = 3.25 \text{ sq in.}$$

use 3 No. 11 = 4.68 sq in.

Top steel at first interior support:

$$A_s = \frac{98{,}300 \times 12}{20{,}000 \times .866 \times 15} = 4.54 \text{ sq in.}$$

use 3 No. 11 = 4.68 sq in.

Bottom steel at first interior support:

$A_s = 2.88$ sq in.
use 2 No. 11 = 3.12 sq in.

Bottom steel at interior spans:

$$A_s = \frac{61{,}400 \times 12}{20{,}000 \times .866 \times 15} = 2.84 \text{ sq in.}$$

use 2 No. 11 = 3.12 sq in.

Top steel at interior supports:

$$A_s = \frac{89{,}200 \times 12}{20{,}000 \times .866 \times 15} = 4.12 \text{ sq in.}$$

use 3 No. 11 = 4.68 sq in.

Bottom steel at interior supports:

$A'_s = 2.30$ sq in.
use 2 No. 11 = 3.12 sq in.

7. Bond Check

$$u = \frac{V}{\Sigma_o jd}$$ (Design Equation)

at first interior support:

$$u = \frac{27{,}400}{13.3 \times .866 \times 15} = 159 \text{ psi} < 210 \text{ psi}$$

at end support (assuming tension on top):

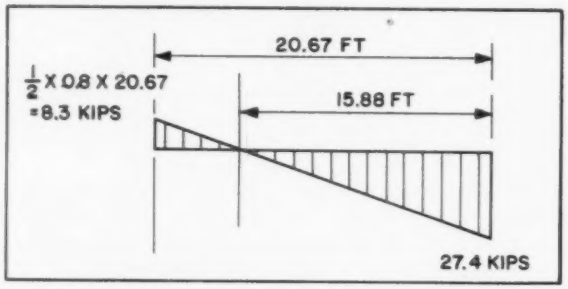
$$\Sigma_o = \frac{23{,}800}{210 \times .866 \times 15} = 8.73 \text{ in.}$$

use 2 No. 11 = 8.9 in.

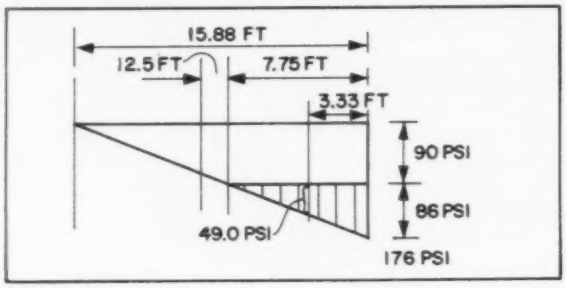
8. Design of Stirrups

To account for maximum and minimum shear, depending on a live load that can be placed to give worst shear conditions, a panel shear diagram will be drawn to give total shear on one side and shear due to dead load only on the other side.

The shear diagram for the design of stirrups at the exterior face of the first interior support is then:



The unit shear diagram is then:



Maximum stirrup spacing = ½d = 7½ in.
Thus $A_s = .0015 \times 12 \times 7.5 = 0.135$ sq in.
Therefore use No. 3 stirrups, with $A_s = 0.22$ sq in.
Initial spacing of stirrups:

$$s = \frac{A_s f_s}{v'b}$$ (Design Equation)

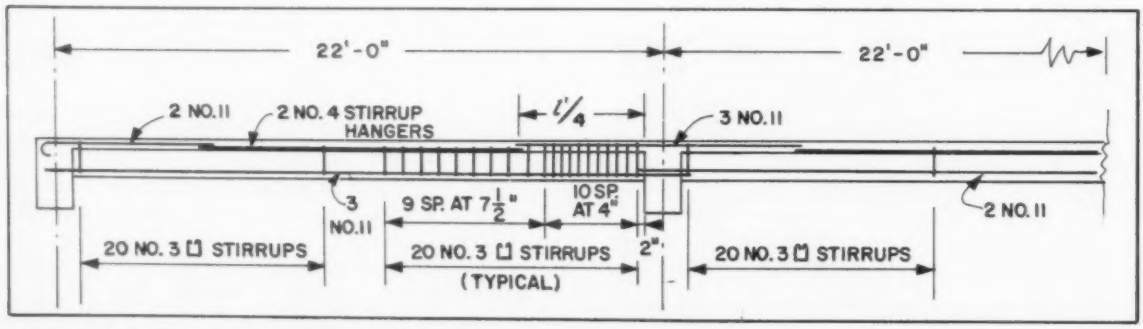
$$s = \frac{.22 \times 20{,}000}{86 \times 12} = 4.26 \text{ in.}$$

Therefore, space stirrups 4 in. on centers. For spacing of additional stirrups:

when s = 7½ in., $v' = \frac{.22 \times 20{,}000}{7.5 \times 12} = 49.0$ psi

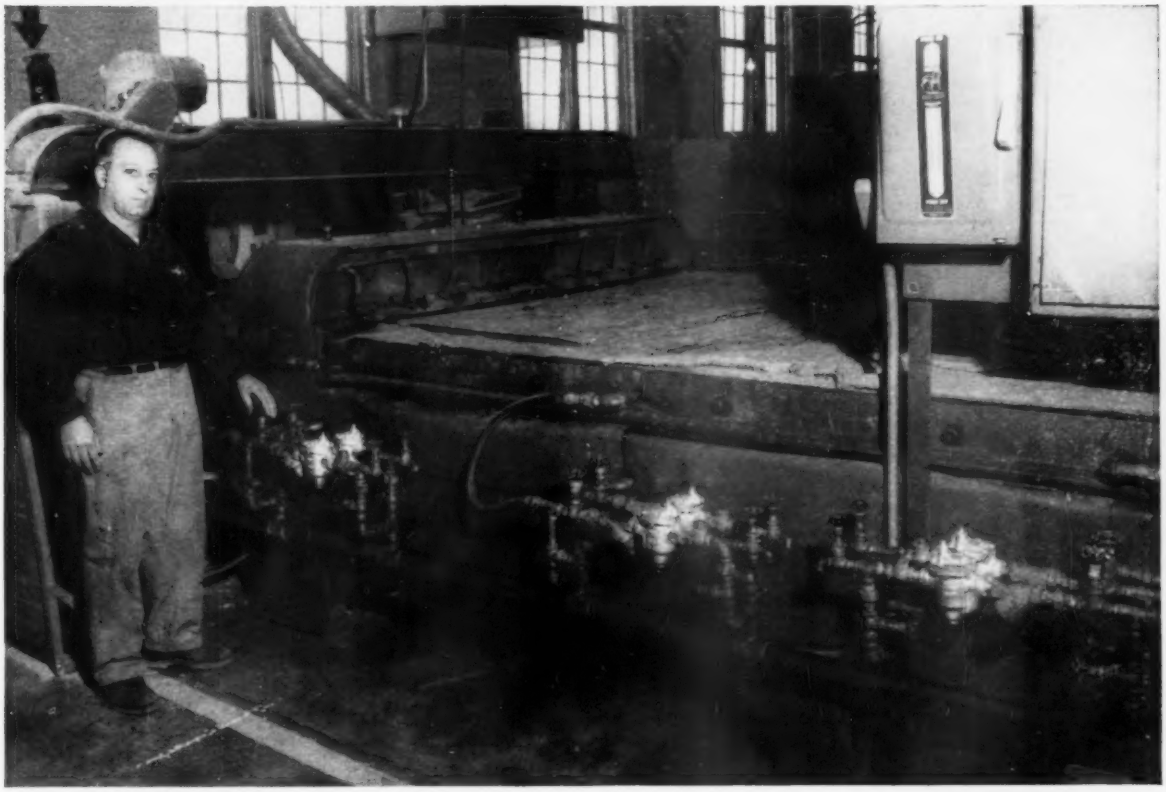
Thus space stirrups, starting at support, at 2 in., then 4 in., to about 3.33 ft from face of support; then at 7½ in. to a point 'd' past the point where stirrups are no longer required.

Although the stirrup requirements are less at other supports, these will be repeated at each support for uniformity.



Design and dimensions of Tee-beam in reinforced concrete floor slab system. Beam is continuous over several columns.

How to Get More Work Out of Steam Heated Equipment



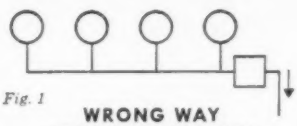


Fig. 1

WRONG WAY
"GROUP TRAPPING"

• One trap drains a group of steam condensing units. This causes "short-circuiting," entrainment of air, low and erratic temperatures. Ask for Bulletin 825 for complete details.

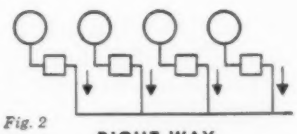


Fig. 2

RIGHT WAY
"UNIT TRAPPING"

• One trap drains *each* steam condensing unit. Condensate *and air* are removed as fast as they accumulate. This assures top temperatures and peak performance all the time.

Example: Armstrong "Unit Trapping" Increases Veneer Press Production 20%

If, anywhere in your plant, you have more than one steam heated machine—or coil, chest or roll of a machine—being drained by a single steam trap, give a listen to this:

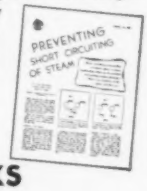
Mr. Dominic Reali, plant engineer at the Stanley Company, Stanley, Wisconsin, was faced with glue joint failures on wood veneer coming off a platen press. The press was group trapped (Fig. 1) when he took over. Platen temperatures were erratic and production was inadequate.

What did Mr. Reali do? He called an Armstrong Representative to help him select a trap for *each* platen of the press. (Fig. 2)

Now, press production is up 20% and glue joint failures are just a memory.

It doesn't matter whether you operate platen presses, jacketed kettles, unit heaters or what, the principle is the same. Armstrong *unit trapping* always makes equipment perform better.

GET COMPLETE DETAILS . . . Armstrong Bulletin No. 825, "Preventing Short Circuiting of Steam" tells the how and why of "group trapping" versus "unit trapping," explains what happens in steam condensing units. Free on request to your local Armstrong Representative, or:



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9129 Maple Street • Three Rivers, Michigan

ARMSTRONG STEAM TRAPS

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THERE'S A PERMATEX SEALANT WITH THE PROPERTIES YOU NEED

Hold it! Hold *any* liquid or chemical . . . with sealants by Permatex—who makes FORM-A-GASKET Numbers 1, 2 and 3—the most famous name in leak-proofing for industry.

The sealants below are *special* . . . the result of laboratory cooperation with Industry. They find use where other sealants can't fill the bill! *Remember*, no liquid or chemical is too special for Permatex . . . and we'll help you with your specific sealing problems on request.

Protect your investment in time and labor when putting in or repairing any fluid system . . . seal with the best . . . Permatex.

SEALANT	FORM	SETS	TEMP. RANGE	FEATURES
Sealant 1282	Brushable black paste. Soluble in water.	Hard	Minus 50°F. to plus 600°F.	For "hard to hold" chemicals. Insoluble in most chemicals used in industry today. Specially resistant to non-flammable hydraulic fluids of the phosphate and silicant ester types. Excellent for use on all types of industrial refrigerants.
Sealant 1372	Black paste. Soluble in alcohol.	Semi-rigid	Minus 50°F. to plus 650°F.	High temperature resistance. Used by leading aviation heating equipment manufacturers to seal heating ducts because it does not produce offensive odors at high temperatures and is vibration and diester resistant.
Sealant 1505	White paste or brushable liquid form (1520). Soluble in alcohol.	Semi-rigid	Minus 60°F. to plus 375°F.	Can be key colored. Resistant to aliphatic hydrocarbons such as gasoline, hexane, pentane, etc.; aromatic hydrocarbons such as benzene, toluene, etc.
Sealant 1516	Black paste. Soluble in perchlorethylene.	Remains pliable.	Minus 65°F. to plus 200°F.	Formulated specially for oxygen assemblies. Meets all safety requirements for threaded, flat or flanged assemblies. Good vibration resistance.
Sealant 1519	Black, brushable paste. Soluble in toluene.	Dries to pliable film.	Minus 50°F. to plus 230°F.	Acid, alkali resistant. Resists hot or cold acid, alkali and salt solutions, as well as lower molecular weight alcohols and glycols.
Sealant 572	Tan, brushable viscous liquid.	Slowly, forming a flexible plastic film.	Minus 65°F. to plus 400°F.	Hydrocarbon resistant. Conforms to MIL-S-7916B. Exceptionally resistant to vibration. Highly recommended for aromatic fuels and lubricants in aviation industry.

Plus complete lines of job-tailored products to keep your equipment producing faster, more safely, with less downtime. All are available at recognized quality industrial distributors.

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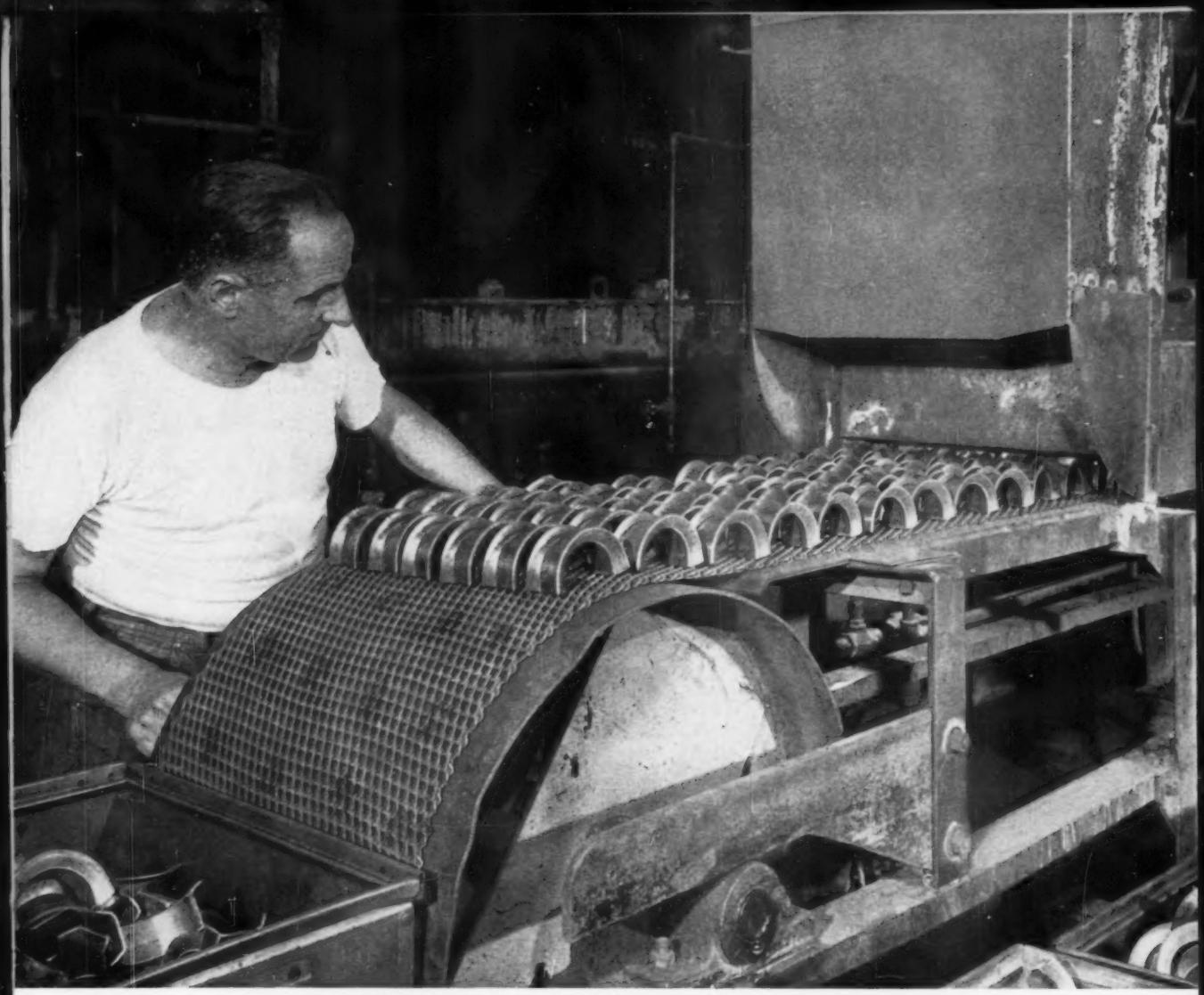

Johnson Bronze Company's powdered metal bearings are shown coming out of a sintering furnace on a Wissco High Temperature Belt.

WISSCO BELTS and the Johnson Bronze Co.

The story of Wissco Belts is best told by their users. For instance, Mr. William A. Lysz, Superintendent of the powdered iron and bronze department, Johnson Bronze Company, New Castle, Pa., reports:

"Our Wissco High Temperature Belt has made it possible for us to double our production . . . reduce operating and maintenance costs."

The belt is used in a sintering operation in which compacted metal powder bearings are conveyed continuously in 20 minute heating cycles through 35 feet of gas atmosphere in a furnace where temperatures range up to 2100° F. The belt has been operating 24 hours a day, 5 days a week for over a year.

"Since we installed the Wissco Belt," Mr. Lysz asserts, "we have had only 4 hours of downtime for belt repair, and very few maintenance problems. The safe, wear-resistant edge, maximum flexibility and freedom from narrowing have combined to give us trouble-free operation. During a whole year, our Wissco Belt has maintained its flat, snug position with no narrowing in width."

"And, the Wissco Belt has proven far superior to other methods used previously," Mr. Lysz continues. "With this new process-conveying system, we have doubled our production and eliminated a great many time-consuming materials handling steps."

There's a Wissco Belt that will substantially improve your high temperature or other processing-conveying operations. Get full details and technical assistance from the CF&I sales office nearest you.

WISSCO BELTS
PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
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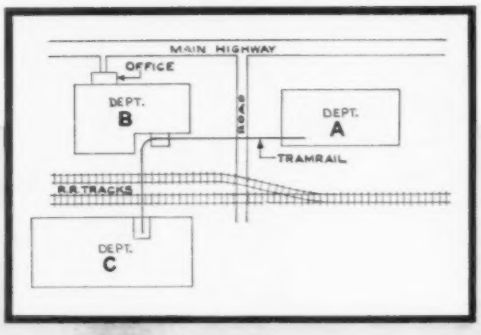
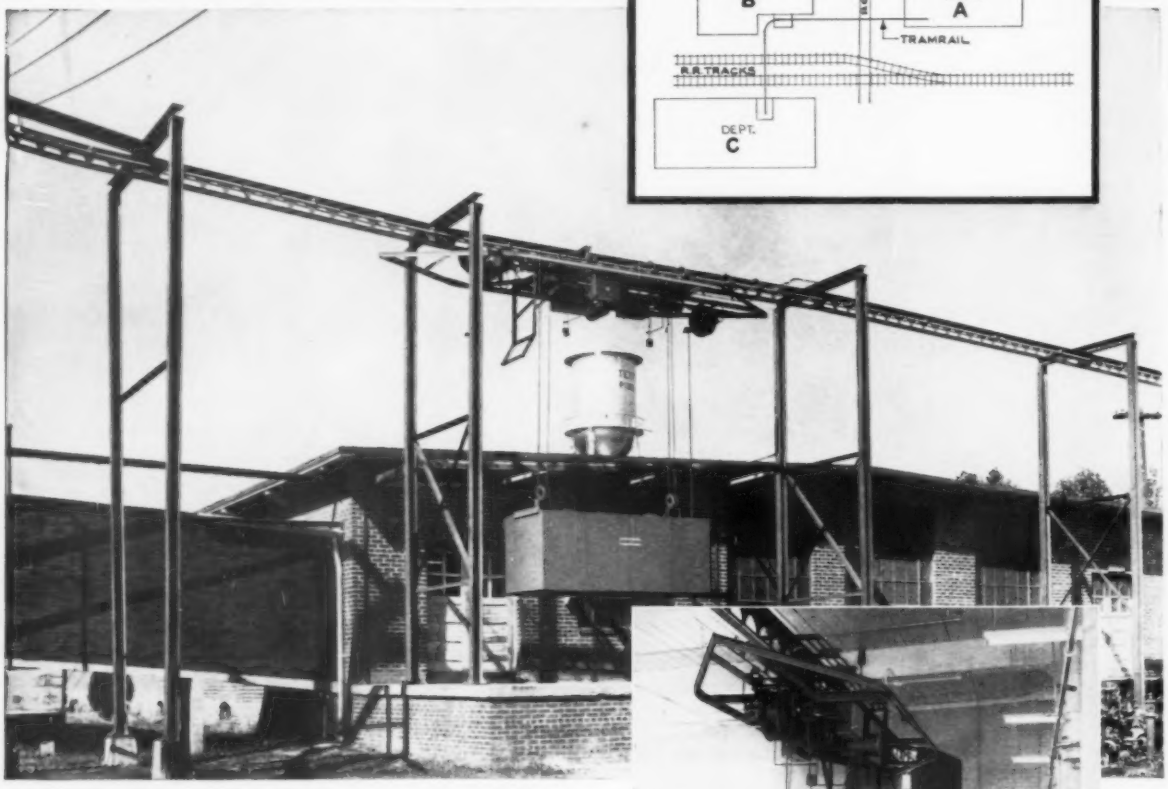
Automatic Handling Between Three Buildings

Operation Costs Plunge Because of Time Saved



Photograph shows van being lowered to outside dock. It remains here until unloaded or loaded and dispatched.



AN automatic Cleveland Tramrail materials handling system operates over a street and railroad to serve three separate buildings. It carries materials back and forth between the plants without need of especially assigned operators. The dispatching of materials is easily handled by men in the buildings along with their other work, since it is only necessary to press a push button to send a Tramrail carrier on its way.

The Tramrail carrier travels up and down grades because the buildings are at different elevations. When it reaches its destination, it lowers at once, automatically. A warning bell sounds as it descends.

Because of the time savings and elimination of need of many powered floor trucks and their expensive maintenance, cost of handling materials between the buildings is very low.

Cleveland Tramrail has engineered a wide variety of automatic materials handling systems. We stand ready to share with you the benefit of our experience.

Loading a Tramrail carrier van with four floor trucks. Each has a load of 250 lbs. Depressing the proper button on the wall sends the van to either of the other two buildings.

Write for free "Automatic Handling" booklet.

CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment

CLEVELAND TRAMRAIL DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 7536 E. 290 ST. • WICKLIFFE, OHIO

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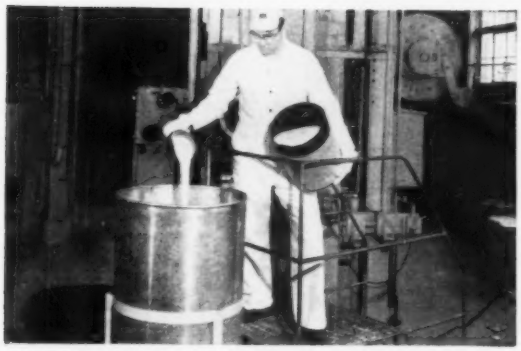
Here are the reasons why—

DRY-ACID CLEANERS based on Du Pont Sulfamic Acid are gaining favor in industrial equipment cleaning

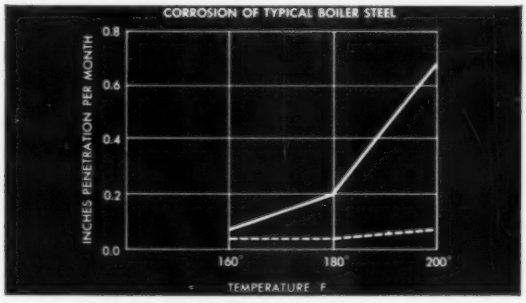


SAFER TO HANDLE—Dry-acid cleaners are dustless, free-flowing powders that *handle* dry. There's no danger of spillage, spatter of liquids or broken bottles.

EASIER TO USE—No siphoning or cumbersome pouring of liquid acid—just scoop or shovel dry acid into make-up tank.

LOWER HANDLING COSTS—Packaged in convenient, easily handled and stored, disposable drums in a variety of sizes. *100-lb.* drum is more than equal to one carboy of 18° hydrochloric acid (gross weight 192 lbs.).

NO HAZARDOUS FUMES—Dry-acid compounds are non-fuming, produce no corrosive gases . . . dry *or* in solution. Special precautions necessary in handling ordinary acids are eliminated.



——— *Inhibited hydrochloric (5% HCl, by weight)*
- - - - - - - *Inhibited Sulfamic Acid (7% by weight)*

LESS CORROSIVE—Cleaners based on Du Pont Sulfamic Acid form solutions equal to hydrochloric acid in penetrating power, yet are far less corrosive (as shown by graph above).

Cleaners based on Du Pont Sulfamic Acid are ideal for removing hard-water scale and other mineral deposits from industrial equipment such as air conditioning and ice-making units, food-processing vessels, steam boilers, milk evaporators and pasteurizers, marine evaporators and heat exchangers.

We'll gladly send you additional information on sulfamic-acid-based cleaners and the names of formulators who offer these cleaning compounds. E. I. du Pont de Nemours & Co. (Inc.), Grasselli Chemicals Dept., Room N-2533, Wilmington 98, Del.

DU PONT REG. U.S. PAT. OFF. **SULFAMIC ACID**

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

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Grasselli Chemicals Dept., Rm. N-2533
Wilmington 98, Delaware

Please send me ( ) free booklet about dry-acid cleaners based on Du Pont Sulfamic Acid. ( ) Names of formulators who offer these cleaning compounds.

*Name*_____

*Firm*_____ *Title*_____

*Address*_____

*City*_____ *State*_____

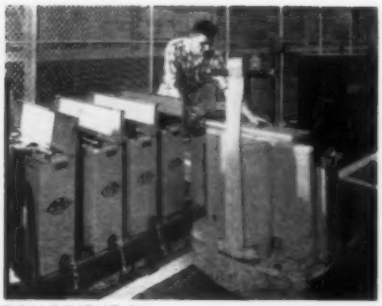
For more facts circle 556 on Reply Card

The battery that makes the difference . . .

C&D Slyver-Clad powers smooth, clean distribution system at new Purity Stores warehouse*

LOWER OPERATING EXPENSES, shown by penetrating cost-comparison studies made by Purity Stores engineers, favored electric trucks, when the fast-growing West Coast food chain planned its new 254,000-square-foot warehouse at Burlingame, Calif. Purity Stores maintains its own smoothly functioning distribution system supplying 100 stores. Handling large quantities of fresh produce and dairy items in confined storage areas, it is imperative that warehousemen avoid contaminating fumes. In an efficient two-shift *electric handling* operation, dependable power is a must. Purity Stores powers its fleet of electric trucks with C&D high-capacity *Slyver-Clad* batteries—exclusively.

RAPID "REFUELING"—C&D batteries are designed to provide sufficient capacity for maximum life while operating on a 10-hour shift without recharging. At end of shift driver can change his own battery. Integral skids on bottom of battery facilitate battery exchange. Trucks are "refueled" without delay.



ROLLS RIGHT ON—Automatic charging equipment saves time and labor. Maintenance man merely plugs charger lead into battery. After the required amount of charge is reached, charger shuts itself off automatically. No danger of over-charging. Battery is simply rolled back onto truck. Hoists are eliminated.

EASY PREVENTIVE MAINTENANCE—Purity Stores follows proper battery maintenance procedures for long, trouble-free battery life. Exclusive C&D Five-Fold *Slyver-Clad* plate design virtually eliminates sediment. Active materials are kept working longer . . . stronger. Proof that: "C&D is your better battery buy."

For details, write for Bulletin IT-530.

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Manufacturers of *Slyver-Clad* ® Industrial Batteries • PLANTICELL and PLASTICAL ® Batteries for Communications, Control and Auxiliary Power • Producers of *Antelloy* • Silicon Chargers.
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WHAT'S JUST AHEAD IN THIS ISSUE?

- KNOWING THE problems that may arise through the use of sound-producing machinery and what can be done to control these noises are the first steps to take in any intelligent noise control program. Fans are, of course, noise producers but their noise levels can accurately be predicted. Such predictions will help plant engineers in their selection of fans by size and horsepower rating. Read the article "Know Your Noise Factors," starting on the next page.

- WHICH RUBBISH disposal system best fits your plant's needs? That is the problem that faced the distribution houses for Western Electric Company. They studied the various systems available to industry and, after a thorough consideration of all the facts, selected the compacting truck method. As a result of this system, one installation has realized a savings of $7500 annually. For all the details, turn to page 84.

- FILTER PRESS equipment only lasted four months before. Now, after being treated with a urethane coating, the equipment is still doing service "at the old stand" for more than two years. Because of its success on the filter presses, the company is even coating wooden ductwork and plant floors. Could you use it in your plant? See page 87.

- WHERE AND WHEN to use dry film lubricants, and what lubricant to use, are detailed in concise form in the two-page article starting on page 90. The tabular material in this article, "Where To Use Dry Film Lube," will prove invaluable to plant engineers faced with high temperature, high pressure lube problems.

- WHEN THE WRITTEN word gave indications of becoming a materials handling problem in their new plant, Automatic Electric installed a pneumatic tube system, complete with an automatic "brain" for control. Thirty-six individual stations, each capable of receiving and sending carriers, required a complex of tubing, a monitor capable of routing a carrier every three seconds, and carriers that could be "addressed." The article beginning on page 96 tells how the system works.

- ONCE USED ONLY for small jobs in the plant, abrasive cutting has graduated to important roles in construction work and maintenance. Recent developments in abrasive wheels and cutting-off machines have made this method of cutting increasingly practical and economical, especially for some difficult jobs. For a guide to many uses of abrasive wheels and how to use them correctly, turn to page 100.

- EVER WONDER HOW you can reduce handling costs when you are manufacturing a myriad of items from small tools to jet engine shrouds? Convair Division of General Dynamics did it by using custom-built, adjustable shelf racks carried on small flat cars, which are made up into tractor-drawn trains. Some 300,000 items are moved every day through the plant in this manner. For the story, see page 106.

KNOW YOUR NOISE FACTORS

How to evaluate and predict room noise levels that may result from the addition of new equipment

By REUBEN A. GERLITZ, Chief Engineer, Propellaire Div., Robbins & Myers, Inc.

THAT INDUSTRIAL noises have an adverse effect on employee health, comfort, and productivity is recognized by progressive organizations. Accidents, lack of efficiency, absenteeism, hearing loss—all may stem from loud or annoying noises on the job.

It is extremely difficult to list on the ledger sheet, but the problems created by plant noises undoubtedly influence production costs. As the trend to more and bigger machinery continues, the necessity for noise control becomes increasingly greater, as evidenced by the rapid growth of the noise control industry in recent years.

In the past, noise was rated in single figure overall decibel levels without regard for the sound frequency or pitch. It has long been known that such ratings were unreliable and inequitable—the louder sound did not always carry the higher rating. This is due to the fact that the ear is more sensitive at the higher frequencies than at the lower. A high-pitched 70 db noise may be considerably louder than a low-pitched 75 db noise.

Single figure decibel ratings are scorned by acoustical experts and are no longer used by progressive organizations. Instead, octave band analyses are utilized whereby the noise spectrum is divided into eight frequency bands, the level of each band measured, and the results combined to give a loudness rating in "sones." Sones are linear units of loudness such that 20 sones sounds twice as loud as 10, and 5 sones one-half as loud. Immediately, we feel right at home with these units, as with inches, pounds, minutes, etc. It is easy to visualize the loudness of any sound compared with another. How superior to decibels in this respect!

A typical noise analysis chart is shown in Fig. 1, where the vertical lines represent the octave band frequencies of the sound and the contours represent the decibel level of each octave band. The horizontal lines indicate the sone loudness of each octave band. A noise analysis is a set of eight decibel readings, one for each band, plotted on this chart and connected with straight lines as shown. Such a curve is known as a noise spectrum. The total sone loudness of a noise is equal to the loudness of the loudest band (highest point on the curve) plus three-tenths of the sum of all the remaining loudnesses. Table I gives the data for the noise spectrum shown in Fig. 1.

Fig. 1. Noise analysis chart. Eight decibel readings, one for each band, are plotted on this chart and then connected.

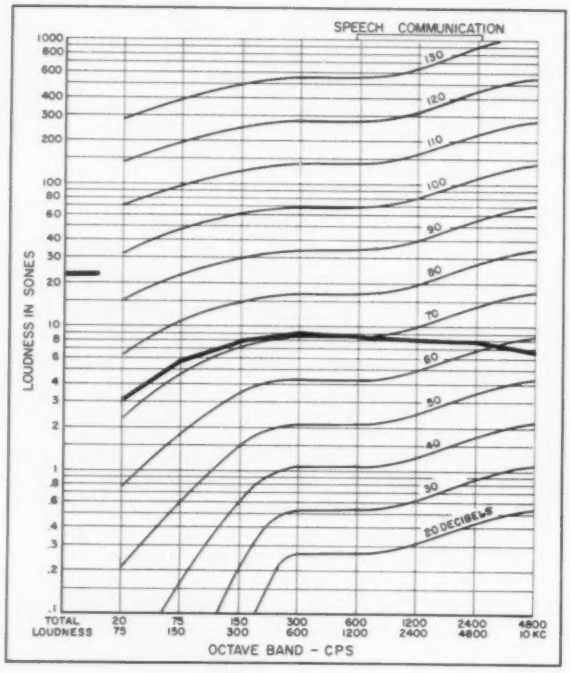


Table I. These are values represented by the data in noise analysis chart, Fig. 1. Figures taken at each decibel reading.

Octave band, cps	20-75	75-150	150-300	300-600	600-1200	1200-2400	2400-4800	4800-10,000
Db level of band	73.0	72.4	71.2	70.7	70.0	67.2	61.9	56.5
Sone loudness of band	3.1	5.8	8.0	9.0	8.6	8.1	8.0	6.7

Total loudness = 9.0 + 0.3 × 48.3 = 23.5 sones

"Recent developments have simplified sound terminology and control techniques, and have resulted in more meaningful noise ratings."

Noise consists of a mixture of sound waves of various frequencies. Sound waves are waves of air pressure which radiate from the source much like the circular ripples seen on the calm surface of a pond when a pebble is dropped into it. As the waves progress away from the source they become weaker and weaker until finally they are dissipated. These waves of air pressure act upon our ear drums vibrating them, stimulating nerve ends, and causing us to "hear."

Nature has endowed the ear with an extremely wide range of sensitivity so that we can detect very

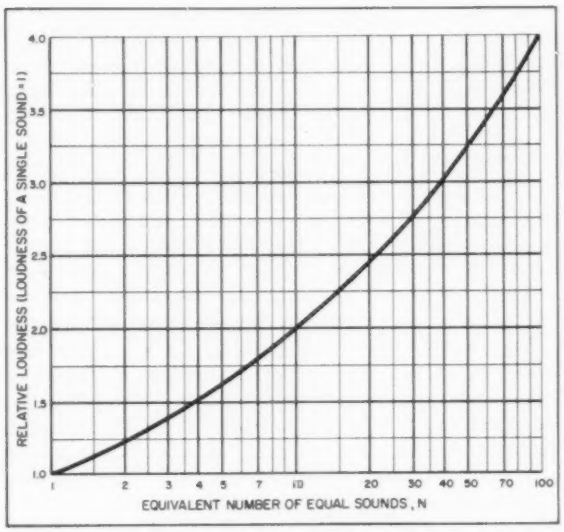


Fig. 2. Effect of adding loudnesses of similar noises.

quiet sounds and yet can withstand very loud sounds without ear damage—a pressure range of from 1 to 1,000,000! This natural protective device causes us to hear with reduced sensitivity as the noise level builds up. Two equal noises do not sound twice as loud as one. It takes ten equal noises to sound twice as loud, and 100 to sound four times as loud.

The effect of adding loudnesses of similar noises is shown graphically in Fig. 2. The chart is strictly correct only for noises with similarly shaped spectrum curves; predominately low frequency noise cannot be added to predominately high frequency noise in this manner. Fortunately, most industrial noise spectrums approximately match the shape of the curve shown on the chart, which is, incidentally, typical for propeller fans.

Noise ratings of machines are generally given for a stated distance from the machine. This refers to the noise level one would observe outdoors in space with no nearby reflecting surfaces. When installed in a room the sound waves are reflected repeatedly from walls, ceiling, and floor and add to the direct sound waves thus increasing the sound level.

At locations near the noise source the sound level at first behaves like it does outdoors in space, decreasing as we move away from the source. This reduction continues until, within a relatively short distance, no further reduction occurs. Beyond this point noise level is uniform throughout the remainder of the room. The "reverberation field," as the area of uniform noise level is called, occupies by far the greater portion of the room.

No material is 100 per cent reflective; all surfaces absorb some sound. Therefore, the greater the surface area of ceiling, floor, and walls the greater will be the sound absorption and the less the reflected noise energy. Therefore, larger rooms have lower reverberant noise levels. It is clear that adding acoustical sound absorption materials (erroneously called "sound insulation") increases the total absorption and thus reduces the reverberant noise level.

Room effect (in the reverberant field) on fan loudness compared with rated loudness is shown in Fig. 3 for rooms of various sizes and with various amounts of acoustical treatment. The relative loudness indicated is for wall mounted fans or upblast (non-hooded) roof ventilators, which are assumed to radiate half of their noise energy outdoors. For other noises multiply the relative loudness values by 1.23.

The diagonal line labelled "Bare Surface, a = 0.02" is for rooms with bare walls, ceilings, and

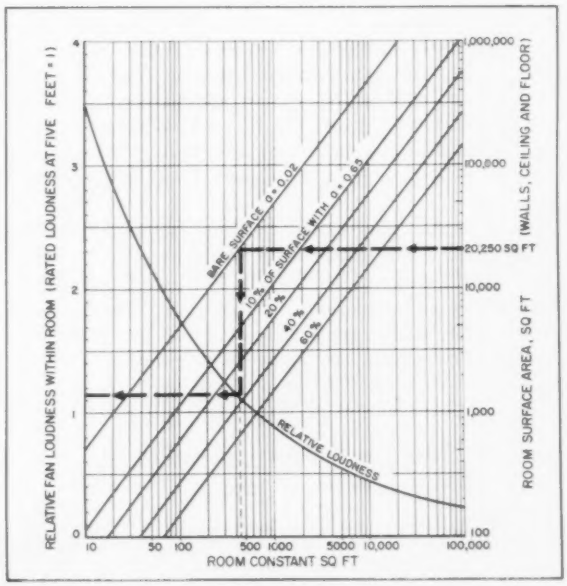


Fig. 3. Room effect on fan loudness for wall mounted fans (one-half of the noise energy radiated into room). For noise from circulators multiply relative loudness by 1.23.

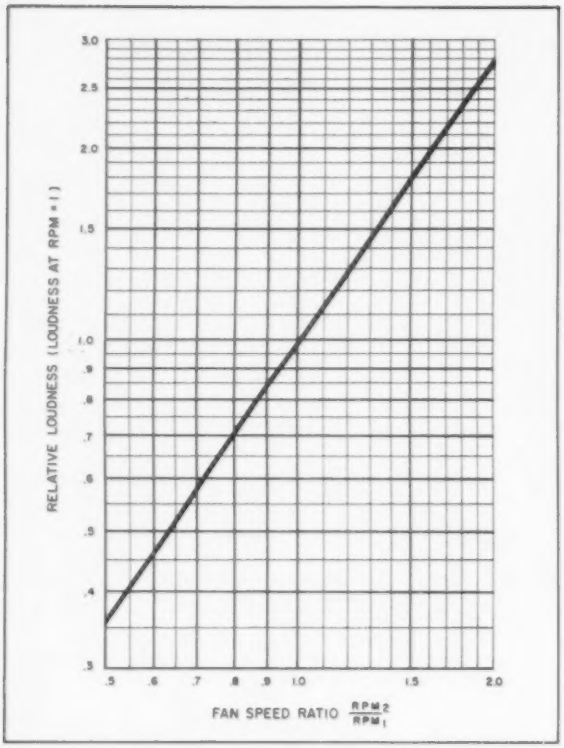


Fig. 4. Effect of change in fan speed on noise loudness.

floors of concrete, brick, sheet steel, glass, or other hard non-porous materials which generally have absorption coefficients a = 0.02. The other diagonal lines are for varying degrees of treatment with acoustical materials, such as acoustical tile on the ceiling, which generally have absorption coefficients in the range of a = 0.65. The dashed line illustrates how the chart is read for a room 75 ft by 100 ft by 15 ft high (inside surface area is 20,250 sq ft) with bare interior surfaces of concrete, brick, and glass having an absorption coefficient of 0.02. Relative loudness is read as 1.13, which means a wall mounted fan in such a room would be 1.13 times as loud as its rated loudness. In other words, a 20 sone fan would produce a room loudness of 1.13 x 20 = 22.6 sones.

In more complex cases involving several different absorption coefficients it is necessary to calculate the room constant, R, by the formula $R = aS \div (1—a)$, where a is the average absorption coefficient of the room surfaces and S is the total room surface area in square feet. The average absorption coefficient is derived from $a = (a_1, S_1 + a_2 S_2 + a_3 S_3 + \text{etc}) \div S$, where the subscripts refer to the various individual surfaces. With the room constant known, the relative fan loudness within the room is quickly found from the curve labelled "Relative Loudness."

Table II. These are loudnesses of typical plant rooms.

Room Type	Sones
Quiet plant	20
Computer room (telephone use difficult)	30
Machine shop	30-50
Plating room (fans, polishers, etc.)	40-60
Punch press rooms	70-120
Risk of ear damage from extended exposure	200

Figure 4 gives the relation between fan speed and loudness for any given fan. It shows, for example, that a 60 per cent increase in fan speed (speed ratio = 1.60) approximately doubles the fan's loudness (relative loudness = 2.01). Here is a quick, simple method of predicting fan loudness when a change in speed is contemplated.

Assuming that the supplier has provided you with sone ratings, these four charts are all that is needed to solve your noise control problems. It is quite natural that calculations based almost entirely on graphs will have some minor inaccuracies, particularly with graphs of this size where a pinprick off the exact point will change the figures. The mathematics that follow are approximate in that decimals round off to the nearest tenth or hundredth.

In order to evaluate the noise predictions which are made by this method we need to know how loud a sone is. Listed in Table II are the loudnesses of typical rooms, with lower limits described as "quiet" and upper limits as preferred maximums.

As a basis for comparison, the room loudness of existing rooms may be estimated from Table II or measured with a sound level meter and octave band analyzer. The sound level meter reads the whole range of audible frequencies at once in terms of decibels. The octave band analyzer takes the output of the sound level meter and reads only the octave band selected, filtering out all other frequencies. A selector switch allows you to read one band at a time so that readings can be obtained for all eight bands. The eight readings are then plotted on a chart like that of Fig. 1, allowing you to read the sone loudness of each band and calculate the total sone loudness as previously described.

In making noise measurements, one should select a spot in the room where the sound field is fairly uniform; that is, far enough away from noise sources so they won't overinfluence your readings. One spot is usually enough. Avoid getting closer than 10 ft from walls or other reflecting surfaces.

Here's Example No. 1

Determine the room loudness with 4 ventilating (wall-mounted) fans, each rated at 25 sones, installed in a room 15 ft by 75 ft by 100 ft that has no sound insulation, or an absorption coefficient of 0.02. The initial room loudness is 30 sones.

(1) Refer to Fig. 2. As the four fans are identical, we have 4 equal sounds, so we find the number 4 on the bottom line, read up to the curve, then left to find relative loudness. We find relative loudness—1.5.

(2) As each fan is rated at 25 sones we multiply this rating by the relative loudness figure in Step 1 to find total rated loudness—25 by 1.5 = 37.5 sones.

(3) Move to Fig. 3. Room surface area equals

Ceiling, 75 x 100 .....7500 sq ft
Floor, 75 x 100 .....7500 sq ft
Walls, 2 x 15 x 100 .....3000 sq ft
Walls, 2 x 15 x 75 .....2250 sq ft

Total .....20,250 sq ft

(4) On Fig. 3, find 20,250 sq ft mark (dashed line) on

"The sone system permits accuracy along with understanding."

right side, proceed to Bare Surface line, then drop from this point to find room constant—430 sq ft.

(5) Where this line crosses the relative loudness curve read the relative fan loudness figure on the left—1.13.

(6) To determine total fan loudness within the room, multiply total rated loudness by relative fan loudness obtained in Step 5 — 37.5 by 1.13 = 42.4 sones.

(7) To add total fan loudness within room to initial room loudness, first convert the greater (in this case, total fan loudness within room—42.4) into an equivalent number of the lesser (initial room loudness—30) with the aid of Fig. 2:

$$\frac{42.4}{30} - 1.41 = \text{Relative loudness of greater noise compared with lesser.}$$

1.41 in the left margin of Fig. 2 is followed horizontally to the curve and down, showing—3.1 the equivalent number of lesser noises.

(8) Add one to this number, representing the lesser noise—3.1 + 1 = 4.1—total equivalent number of 30 sone noises.

(9) Again from Fig. 2 the total relative loudness corresponding to 4.1 is found by starting at 4.1 on bottom line, reading up to curve, then left to—1.53.

(10) Completing the calculation begun in Step 7, multiply the total relative loudness figure by the lesser number in Step 7—1.53 x 30 = 45.9 sones—final room loudness.

Answer: The installation of four 25-sone fans under the conditions of Example No. 1 should result in a total of 45.9 sones, an increase of 15.9 sones or 53 per cent over the initial room loudness of 30 sones.

Another example might involve the addition of, say, a fan rated at 75 sones to the four 25-sone fans in Example No. 1. Simply convert the new fan into an equivalent number of the others and proceed as outlined. (75 sones is three times as loud and therefore has a relative loudness of 3.0 as compared to 25 sones; move from 3.0 on the line at left in Fig. 3 to the curve, then down to the equivalent number of 39. Instead of four 25-sone fans, you would measure the effect of forty three.)

When comparing the noise of a series of fans with different characteristics, it is often desirable to know whether a group of this model or a group of that model will be quieter when handling a given total volume of air. A highly convenient device, which we shall call the Q factor, shows the comparative loudness of each fan when delivering the same volume of air (theoretically, 1000 cfm).

The Q factor for each fan may be listed in supplier's catalogs or may be determined by the formula $Q = SN^{0.3}$, where S equals the sone rating of a single fan and N equals 1000 cfm divided by the fan's rated cfm. Given the Q factor, it is possible to make a quick visual selection of the quietest fan for your circumstances.

Here's Example No. 2

The question arises as to whether a large number of small volume fans or a small number of large volume fans would be quieter in producing a given total volume of air.

The following performance characteristics are listed for five fans operating at 1150 rpm, and you are asked to determine the quietest group that will move approximately 130,000 cfm. This requires the use of the Q factor, which is not listed. How do you find it?

Fan	60 in. 10 hp	48 in. 5 hp	36 in. 2 hp	24 in. ½ hp	16 in. 1/12hp
Rated cfm	64,600	37,150	16,400	6,840	1,865
S, sones	91	68	43	17½	8

In the formula $Q = SN^{0.3}$ we now have the S given, and we can find N by simple division, 1000 cfm divided by fan's rated cfm. In the largest fan, then, N equals 1000 cfm ÷ 64,600 cfm or 0.01548; the others may be found in the same manner.

N	0.01548	0.02692	0.06097	0.1462	0.5362

Substituting these S and N values in the equation, we find:[1]

Q	26.06	22.98	18.57	9.83	6.64

At this point, it becomes obvious that the quietest group would be the 16 in. 1/12 hp. The largest fans would be 3.93 times louder. This is the comparative loudness figure.

If the problem were to find the total loudness (T), we would have to use the formula $T = Q$ (total cfm 1000 cfm)$^{0.3}$ and find the number of fans of each type required to deliver the required 130,000 cfm.

Number	2	4	8	19	70
Total cfm	129,200	148,600	131,200	129,960	130,550
$\frac{\text{Total cfm}^{0.3}}{1000\ \text{cfm}}$	4.29	4.48	4.32	4.31	4.31
T, in sones	111.7	103.0	80.2	42.4	28.6

It should be noted that the comparative loudness figure has not changed appreciably. The largest fans are still 3.91 times louder than the smallest fans; this ratio would be exactly 3.93 if the total air volumes of the two were equal.

Reducing the horsepower can effect a major reduction in total noise. Compare the following figures for a 60 in. 1 hp fan with those of the 60 in. 10 hp fan:

Fan	60 in. 10 hp.	60 in. 1 hp
Rated cfm	64,600	28,400
S	91	14
N	0.01548	0.0352
Q	26.06	5.13
Number	2	5
Total cfm	129,200	142,000
$\frac{\text{Total cfm}^{0.3}}{1000\ \text{cfm}}$	4.29	4.42
T, in sones	111.7	22.7

Knowing the problems that stem from annoying industrial noises and what can be done to control their possible ravages are the first steps in any noise abatement program. The steps that follow are logically taken in the areas of noise evaluation.

The sone system described here is gaining increased usage in connection with noise-producing machinery, for it combines the needed accuracy with the easily-understood concept of relative loudness. As realistic and usable as inches, pounds, and degrees, the sone is expected to take its place in the plant engineer's vocabulary.

A convenient slide rule type of noise calculator incorporating the principles set forth in this article has been devised by the author and is available at nominal cost. The user will find it to be faster, more simple, and more versatile than charts. **End**

[1]Detailed calculations involved in solving the formula $Q = SN^{0.3}$ may be obtained by writing the Editor, Plant Engineering.

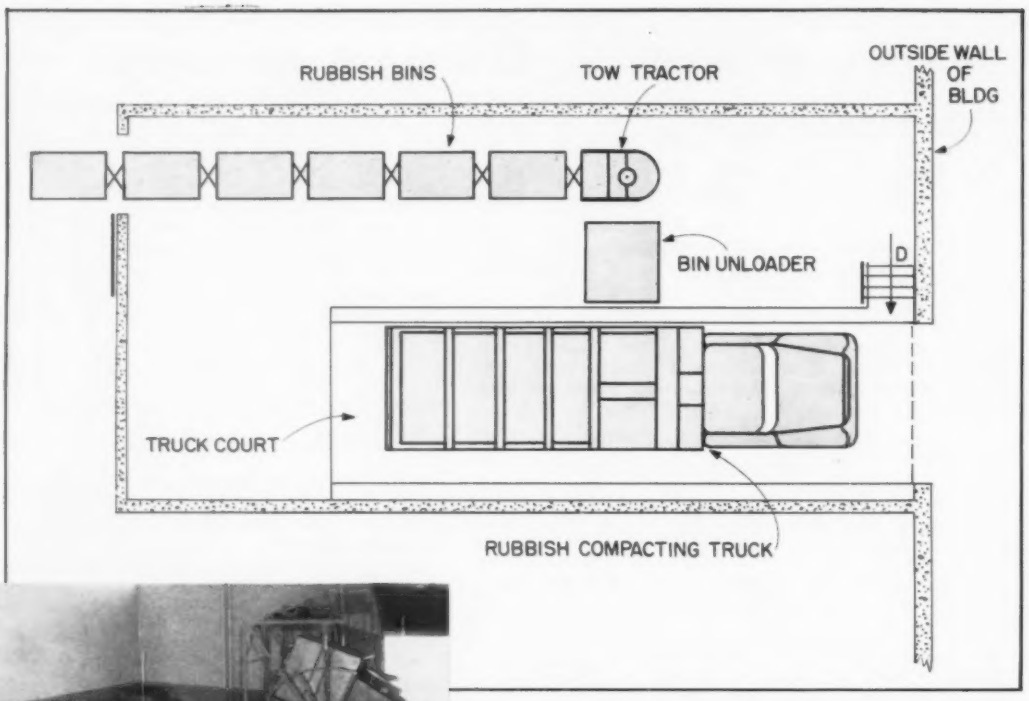


Fig. 1. After studying various rubbish removal systems, Western Electric selected a compacting truck to handle rubbish at its many Distributing Houses. View above and left shows central collection area for rubbish removal.

RUBBISH REMOVAL STUDY—
Final Choice Saves $7500 Annually

By LAWRENCE A. SQUITIERI, Engineer, Distribution Planning Organization, Western Electric Company

USE OF a compacting truck for rubbish removal at Western Electric's Distributing Houses has permitted mechanization of an increasingly large task. The new system grew out of a study of the economics of various types of rubbish removal systems.

Western Electric's duties cover the manufacture and supply of telephone equipment for the entire Bell System. The distribution of small packaged equipment and the repair of equipment for your local telephone company is handled by a number of Distributing Houses located throughout the country.

Distributing Houses may be considered as the telephone companies' equivalent of the department store. The very nature of the work requires the disposal of all waste packaging materials that remain. As the telephone business has grown, the volume of this waste material has increased proportionately and has reached the point at some locations where the old method of rubbish removal is entirely inadequate and, at times, very costly.

It is estimated that the Cleve-

Fig. 2. This mechanical unloader is one of the additional pieces of equipment required for setting up this system.

land Distributing House, for example, accumulated 170 cu yd of loose rubbish every working day. If this material, which is 90 per cent paper products, were allowed to accumulate, the entire building of some 335,000 sq ft would be filled to the ceiling in six months.

This rubbish is normally disposed of by an outside contractor. Our cost of disposing of rubbish is based on its volume and in most cases does not depend on the material's condition, whether loose or reduced in volume by compression. Since Distributing House rubbish is approximately 90 per cent cartons and compressible material, the basic problem in our rubbish handling operation was the expeditious and economic reduction of the initial rubbish volume within the Distributing House with standard or commercially available equipment.

Our rubbish handling initially extended only from the point of accumulation to the rubbish room; handling from the rubbish room to the dump site was left to the contractor. Based on these past practices, various methods were thoroughly investigated.

Studies of baling operations indicated several interesting points. With baling, segregation of foreign material from saleable paper is required. Extra large cartons must be pre-broken to fit the baling machine. In addition, considerable space is required to store bales prior to shipment.

Of course, storage of large quantities of paper in one particular area would present a fire hazard. The remaining rubbish, such as floor sweepings, scrap wood, cafeteria garbage, and noncombustibles required separate handling and disposal.

The total operating costs incurred in a baling operation are far in excess of the return on the saleable paper board. It was decided that only during a national emergency, when waste paper becomes a highly important material, is the operation feasible.

Incineration is being practiced in some of our older buildings, and studies indicate this method also results in a high operating cost. Generally, incineration is carried on to dispose of combustible materials, with the recovery of heat for such things as hot water being considered a return.

Analysis shows the cost of this type of operation was approximately twice the cost of using conventional fuel for the same purpose. Furthermore, many cities have local ordinances controlling air pollution which prohibits incineration.

Various Systems Studied

A condition which is common to the baling operation also exists for incineration, and that is the additional labor required for segregation and disposal of foreign materials. There are also other costs such as ash removal and incinerator maintenance which must be considered. The net result was that the incineration method of rubbish disposal was not practical or economical for our use.

Since the importance of reducing the physical dimensions of rubbish is so evident, a study was made of masticators, such as prebreakers, hammermills, shredders and grinders. With this massive equipment, it was found that it would be necessary to give special acoustical treatment to the immediate vicinity or have the equipment isolated to eliminate or diminish the objectionable noises.

Such units have a high operating cost in addition to a high initial investment. Unless the masticated rubbish has some importance as a by-product, this type of installation could not be justified economically.

The next consideration for reducing the initial volume of the rubbish was given to commercially available rubbish compacting trucks. This equipment afforded several advantages over previous methods considered:

1. It reduced the initial volume of rubbish without segregation and without much consideration to the size of the object handled.
2. It provided a satisfactory and safe method of rubbish storage without additional handling from a storage bin to some transportation vehicle.

This type of operation, however, was a complete deviation from the usual practice of rubbish handling since it now involved the handling of rubbish from the point of origin directly to the dump site.

This would involve the Distributing Houses directly in rubbish disposal, but would eliminate the problems associated with outside contractors such as providing storage space for accumulated rubbish or, alternately, paying for having a truck available to us at all times.

A preliminary materials handling method was developed for the one-story warehouse operation which is typical of most of our Distributing Houses. The system as finally set up, Fig. 1, required the installation of some associated equipment—special bins and a truck loading device.

In the new setup, portable collection bins are strategically located throughout the building area. Empty bins are towed to collection points in train fashion using a commercial tow tractor. They replace filled bins which are subsequently towed to the rubbish staging area near a truck court.

In a typical Distributing House, a rubbish collector travels about 15 miles per day on his collecting rounds. In the rubbish staging area, filled bins are upended

mechanically and emptied into the rubbish compacting truck.

The lightweight collection bins were specially designed to incorporate towing and dumping features. Special consideration was given to towing bins through narrow aisles and the final results permit a train of six bins and the tractor to negotiate a right angle turn in seven-foot aisles.

The bin is of one and one half cubic yard capacity and supersedes all previous rubbish containers with the exception of flammable waste containers and cafeteria garbage cans.

Although this container does not have a fusible linked self-closing cover, its use is permitted because rubbish is not stored in them overnight. Filled containers are immediately emptied into the waiting compacting unit. This arrangement meets with the Fire Underwriters' approval and provides for a low cost container. The mechanical unloader in the staging area, Fig. 2, is a self-contained unit specially designed to handle the trash bin. Collection bins are uncoupled from the train and pushed into the dumper where forks engage stirrups under the bin. The unloader is operated by a hold-down pushbutton. Rubbish is discharged directly into the truck, Fig. 3. The dumping cycle takes 35 seconds.

In effect, the compacting truck is a modified baling machine, mounted horizontally. Rubbish is dumped through the opening at the front end of the body. The opening is cleared by the moving platen which also compresses the rubbish, thereby reducing its initial volume.

These commercial compacting trucks were modified to include remote control outside the cab, since all trucks are adjacent to a loading dock which is 48 in. above ground level and all the operations are conducted from this platform.

These controls permit the operator to actuate the platen or packing plate without entering the truck's cab. The compacting truck will accept all types of material whether compressible or not, providing it passes through the loading opening with no segregation being required. This was a great improvement over other methods considered.

The only restriction on the type of material that may be hauled in a truck load is governed by the regulations at the dump site and, in almost all cases, this had not been a factor. When the truck is fully loaded, a Western Electric employee drives it to the dump site. The unloading is accomplished by unlatching the rear door and operating the platen so that the refuse is pushed out to the ground. The average volume reduction obtained in the truck for the type of rubbish removed from Distributing Houses exceeds a 4 to 1 ratio.

Use of a compacting truck and its associated equipment has permitted a reduction in floor area previously required for rubbish storage, provided excellent housekeeping facilities, and most important of all, reduced annual operating costs for rubbish removal.

The complete rubbish operation —collecting, dumping, compacting, and ultimate disposal at the dump site—is entirely mechanical and conducted for the most part by one employee, who may occasionally need some assistance with exceptionally bulky items.

As in all equipment installations, the basis for justification is cost reduction plus efficiency and this has definitely been accomplished with the compacting truck and its associated equipment. From the studies made for five installations, the anticipated savings averaged 30 per cent to 50 per cent over the usual contractor method, and rubbish removal costs using compacting equipment average 25 cents to 45 cents per cubic yard of loose rubbish. Savings vary, of course, with local conditions and can be obtained only through an analysis of the problems which exist at a specific location.

One Distributing House, whose annual cost was $17,000 using an outside contractor to remove rubbish, provides a typical example of the savings which can be realized. The annual costs with the new compacting method is approximately $9500, yielding a savings of $7500 per year.

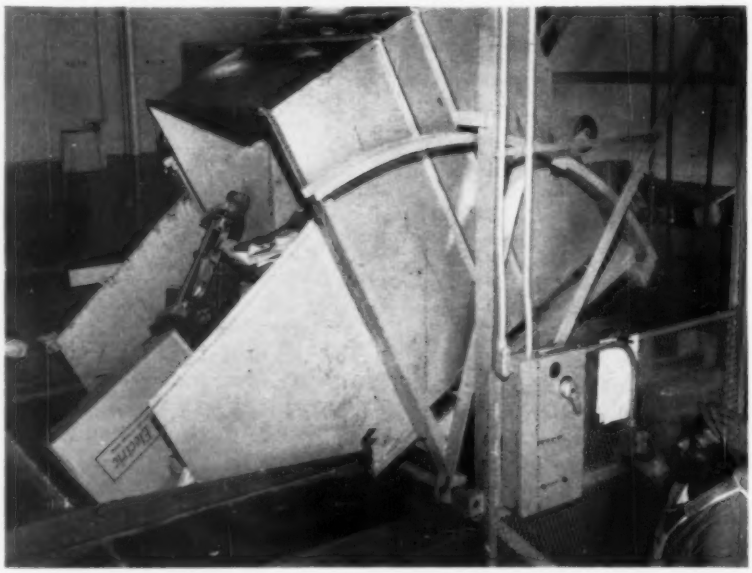


Fig. 3. Unloader is operated by a hold-down pushbutton. Rubbish is discharged directly into compacting truck. Complete dumping cycle takes only 35 seconds.

Installations of this equipment are at the Atlanta, Cleveland, Los Angeles, New Jersey and Syracuse Distributing Houses. Two additional installations of a compacting truck and its associated equipment will be made this year at Washington and Detroit.

The new rubbish disposal setup represents a long step toward mechanization, and incorporates many of the newer concepts of materials handling. **End**

URETHANE PAINT PROTECTS:

1. Filter Press
2. Ductwork
3. Plant Floors

By EDWARD J. AQUADRO
Plant Manager
Interchemical Corporation

Fig. 1. Here is what can happen to the wooden frame of a filter press after only several months' use. By applying a urethane coating, the service life of these frames has been extended to more than two years.

IN THE PAST, a new wooden filter press, costing some $2500, has on occasion lasted no more than four months. Now, by investing another $700 in materials and labor we can apply a protective coating which will make the same press withstand heavy-duty service for several years. Not only are we saving capital funds, but we are also reducing expensive downtime on this equipment.

The coating, formulated from an isocyanate produced by Allied Chemical's National Aniline Division, and castor oil, offers several advantages which are important to plant engineers in maintaining plant equipment.

Filter presses come in a range of sizes, from a 24-in. press up to the largest, whose square frame measures 56 in. on a side. They are used to extract the press cake from a solution, and can be found in almost any chemical plant manufacturing dyestuffs, detergents, rare earths, and similar materials.

The best woods for filter presses are the resinous types, such as long-leaf yellow pine, cypress, sometimes maple. Other materials for press frames and plates have also been tried, but are not used too often for one reason or another.

Filter press materials may be subject both to acid and alkaline solutions. Sometimes, these are alternated, which is a particularly severe test of the frame lumber because it has a tendency to leach out the resins, causing the wood to split, splinter, check, or swell. Press members will then be unable to contain the 60 psig pressure required to remove the liquid, and start to leak.

Generally, all of the frames and plates—there may be up to 62 of them in a single press—will have to be replaced. In one instance, where the solution contained 10 per cent sulfuric acid at 200 F, press plates were no longer serviceable after only four months.

We first investigated the urethane coatings in 1956. We disassembled an old press which had already seen 24 months of prior service, dried frames and plates thoroughly, then applied the coating. We expected the press to function another year because of this treatment. It is still in operation two years later.

We have since coated all new wooden press members with excellent results. Coated frames and

Fig. 2. Three coats of urethane paint protect frames against attack by acids and alkalis. Each coat is allowed to air-dry before the next is applied. Final thickness: five to eight mils.

Fig. 3. After many months of filtering pigment out of an acid solution, this experimental 24-in. filter press is still as good as new. No signs of wood deterioration are visible.

plates now swell very little due to poor application. If one, on occasion, does need replacement, it can be removed and another inserted in its place. Formerly all frames and plates were so badly misshapen that replacement of an individual unit was impractical.

The coating has helped protect the wood against the attack of moisture and chemicals in another way. Press plates are made up of a number of strips of lumber, butted against each other by means of a tongue-and-groove joint, then held together by a transverse, high nickel-alloy bolt. We receive them in this assembled fashion from our supplier.

Fig. 4. The coating completely seals the wood. Paint pigment does not penetrate into the fibers, enabling the frames and plates to be cleaned easily.

We formerly coated the exterior surfaces of the assembled frames before inserting into the press and were surprised that some attack was still taking place, mostly near the butt joints. We found that the liquid was penetrating into the joint faces which were unprotected. Now, the supplier coats the tongue and groove of each plank before assembly, and the life of the plates has been still further extended.

The coating offers two other advantages. The surface, after coating, is much smoother and resists penetration by the pigments we manufacture. In changing from one color to another, therefore, press parts are cleaned up readily, with less contamination of the subsequent product.

Also, the coating protects frames and plates against absorption of moisture. As soon as they are received in our plant, they are coated, and can now be stored indefinitely without fear of warping.

Results with wooden filter press members have been so successful that we are considering the coating for every wooden structure within the plant. Other timber, especially around kettle openings, is also being coated, to keep it from rotting.

Fumes from a chemical plant are often highly corrosive and removing them from the premises can present quite a problem. Ductwork, if of sheet metal, will corrode in short order, and expensive draft fans can be ruined quickly unless they are suitably protected.

To reduce corrosion damage, fan blades and other sections in contact with the fumes are completely rubber-lined. This creates something of a balancing problem, and in general makes the fan much more expensive.

Ductwork is often fabricated of asbestos board. Although corrosion is checked, the ductwork is heavy, requires good support, and

is not too easy to install. Furthermore, joints often begin to leak, no matter how well they are cemented. Reinforced polyester has also been used, although it is fairly expensive.

We are hoping that the urethane coating may be an answer to both of these difficulties. In March of this year, we coated one standard steel-bladed fan exhausting corrosive fumes, to see how well the urethane-based paint will hold up. So far, no signs of corrosion have been noted.

At the same time, we also constructed some ductwork, venting from a scrubber on the plant roof, out of ¼-in. pressed wood, and coated it both inside and outside with the same formulation. Here, again, we are watching developments very carefully to find out whether this cheaper, quicker, and easier method of construction will last long enough to be practical.

Another application for the coating is as a temporary patch in glass-lined tanks. Mechanical or thermal stresses sometimes cause cracks in the glass, or small sections flake off. Standard repair techniques may require shutting down the tank, or take too long. We have discovered that two or three coats of the urethane-based paint will prevent corrosion attack until a permanent repair can be effected.

Finally, we are applying the coating to several concrete floor sections, subject to acid dripping. Sulfuric acid will, in very short order, destroy even the best of concrete floors. The coating prevents this deterioration.

The coating, formulated as shown in table, can be prepared fairly readily by plant personnel. However, certain precautions must be taken.

In preparing a urethane-based maintenance paint several factors have to be kept in mind. They are idiosyncrasies of the paint which, if ignored, can lead to definitely inferior results.

Water in the coating is intolerable, even in small amounts. For this reason, we do not mix up a batch on a very humid day but wait until the weather is dry. Similarly, the substrate must be dry. In the case of metal or concrete, we achieve this by giving the surface a quick wipe with a toluene-soaked rag. In evaporating, toluene takes the moisture along.

Table gives formula for preparing coating. It can be prepared by plant personnel.

Urethane Coating Formulation	
Nacconate* 300	930 parts by weight
Ethyl acetate	465 parts
Toluene	465 parts
Castor Oil	1000 parts
Cobalt Naphthenate	4.7 parts of 6% soln. in mineral spirits
Lead Naphthenate	9.7 parts of 24% soln. in mineral spirits

*Registered Trademark—Allied Chemical Corp.

Wooden structures should be allowed to air-dry thoroughly, before being painted. Otherwise the adhesion of the coating is highly questionable.

In fact, the adhesion of the coating is so high that on one occasion it worked against us. Several press frames and plates had been painted, but had not been allowed to air-dry completely before being stacked one on top of the other. All of them stuck together and had to be pried loose with a crow bar. In most cases, the frames came apart due to rupture of the wood, not the coating, so that all of them had to be sent back to the mill for replaning.

Shelf life of the coating, too, is critical. The coating which gives us the best results has a shelf life of some three weeks. After that, polymerization begins, with an increase in viscosity and a weaker bond. Shelf life can be adjusted to some extent by the formulation, but in extending it we also lose some of the desirable characteristics of the finished film.

The coating is essentially a two-component system: isocyanate-castor oil prepolymer, and catalyst, the latter being added only when the coating is to be used. Once the catalyst is stirred in, the formulation will begin to gel, and must be used up within 24 hours. It takes only 21 g of catalyst to harden one gallon of coating.

One gallon will cover approximately 300 to 400 sq ft, with a total coverage of about 5 to 8 mils. We need about 20 gallons to protect one complete filter press. **End**

Fig. 5. Ductwork leading from the acid scrubber exhausts highly corrosive ammonia fumes and other organic dusts. Made of pressed wood, coated on both sides with urethane paint, this type of ductwork is cheap, light and easy to install.

Lubricant Type	Thermal Stability	Wear Life	Fluid Resistance	Corrosion Resistance
Graphite and oxides with thermosetting binder.	−65 to +600 F	75 to 100 hr under 900 lb load.	Distilled water, oil, dioxane, Dow Corning 550, Skydrol 500, and most volatile solvents.	Prevents oxidation of anodized aluminum up to 1300 hours; steel, 100 hours in standard salt spray tests.
Molybdenum disulfide, graphite with thermosetting binder.	−300 to +600 F	200 to 600 hr under 900 lb load.	Distilled water, tap water, oil, Skydrol, xylene, dioxane, liquid oxygen, DC 200 silicone fluid, trichlorethylene, etc.	Fair.
Graphite, molybdenum disulfide with silicone and phenolic binders.	−65 to +800 F	Over 1000 hr under 900 lb load.	Distilled and tap water, oil, grease, hydraulic fluid, dioxane, xylene, trichlorethylene, liquid oxygen, etc.	Inhibits fretting corrosion.
Synthetic graphite, bearing metals, oxides with ceramic binder.	−65 to +1500 F (May have short service life up to 2000 F)	Up to 50 hr under 630 lb load, above 1000 F.	Dioxane, oils, greases, distilled water, most solvents, some acids and alkaline solutions	Similar to porcelain enamels
Molybdenum disulfide with plasticized resin binder.	−65 to +500 F	Up to 275 hr under 225,000 psi, 72 rpm	Dioxane, xylene, trichlorethylene, liquid oxygen, DC 200 silicone fluid, tap and distilled water, Skydrol, oils, and greases.	Fair.
Graphite with polyester resin binder.	−65 to +350 F	Over 100 hr under 900 lb load.	Tap and distilled water, most solvents, oils, hydrualic fluids, greases, etc.	Good.
Molybdenum disulfide with silicone binder.	−200 to +600 F	Over 500 hr under 900 lb load.	Distilled and tap water, most solvents, oils, greases, etc.	Good.

Plant Engineers' Guide—

WHERE TO USE DRY FILM LUBE

By RALPH E. CRUMP, Chief Engineer, Electrofilm, Inc., North Hollywood, Calif.

IN GENERAL, dry film lubricants should be used where comparable media—in liquid, semi-fluid, or gaseous forms — are either wholly or partly unsatisfactory. For example:

Where galling and seizing is a special problem (as in the lubrication of mating surfaces made from aluminum and titanium).

Where such parts as bearings are either inaccessible or likely to be overlooked on a routine lube schedule.

Where non-continuous operating schedules make conventional maintenance lubrication expensive over long periods.

Where low or high operating temperatures impair or eliminate the lubricational characteristics of oils.

Where fretting corrosion cannot usually be avoided.

Where environmental conditions—due to the presence of such things as fuels, volatile solvents, and liquid oxygen — make conventional lubrication impractical.

Where it is necessary to eliminate contamination due to the dripping of liquid lubricants onto floors, adjacent parts, etc.

Where dust or airborne debris attracted by other lubricants can impair the operation of moving parts.

Dry film lubricants can be briefly described as coating dispersions containing such materials as powdered graphite and molybdenum disulfide. They are applied much the same as ordinary paints.

Because they are relatively expensive, and because they cannot be replaced or replenished as readily as conventional lubricants, they cannot be regarded as a cure-all for the plant engineer's lube problems. But, as already implied, they may very well be a practical solution to many problems that have not yet been solved.

In many types of food processing machinery, for instance, solid film lubricants represent a highly practical method of minimizing friction without incurring product contamination.

Like related products, dispersions for dry film lubricants are formulated for a variety of specialized applications. It is not the purpose

Application Methods	Preferred Uses
Deposition surfaces should be clean and grease free; may be sandblasted, etched, anodized, or phosphated to improve adhesion of film. Lubricant dispersion is dip or spray applied, and may be baked at 300 F for one hour	Best results obtained where a combination of high corrosion resistance and long wear life are needed—as in outdoor mounting pads, clamp and seal couplings for heavy-duty machinery, etc. Wear life is greatly increased where loads under 900 lb are employed.
Same as above, except for baking—which should be done at 375 F for one hour.	This is one of the better general-purpose solid film lubricants for high load applications; is used on diesel pistons and cylinders, hinge pins, plug valves, leaf springs, gears, rocker arms, bushings, cams and followers, fasteners, plain bearings, escapements, titanium bolts, rod end bearings, mechanical timers, lock nuts, etc. Relatively low loads and temperatures mean better wear life.
Same as above, except for baking—which should be done at 500 F for two hours.	Gives best results where moderately high temperatures and high load capacities are needed as in spherical bearings, hinge pins, fasteners, shafts, journals, and couplers for industrial heating equipment. Will stand up for short periods at temperatures as high as 1000 F, but less heat and lighter loads mean better wear life.
Applied only to high temperature metals. Latter should be degreased, sandblasted, and chemically etched. Dispersion is sprayed on, dehydrated at 250 F for 30 minutes, then baked at 1000 F for 15 minutes.	Used only where better wear resistance is needed at high temperatures—for example, on Monel sleeve bearings, stainless steel fasteners, hot gas valves, and drive shafts for power plants; hinges and fasteners for industrial furnaces and ovens. Here again reduced loads will increase wear life.
Materials may be cleaned and pretreated using any of above-named methods. Dispersion may be spray or dip applied, then cured at 375 F for one hour.	Is outstanding where a lubricant must resist displacement due to high loads—as in ball joint bearings and rod end actuator units. May be satisfactorily applied to parts that have chrome or nickel plating.
Same as above, although lower curing temperatures are allowable. In fact, this dispersion will solidify in a short period of time at room temperature.	Principally useful where low curing temperatures are mandatory—due either to a lack of specialized application facilities or the poor heat resistance of deposition materials. Increased wear life by preventing galling and seizing.
Same as above, except for curing temperature—which should be 400 F for two hours.	Gives best results where oil or grease lubrication should also be used—for example, on pistons and rings for gasoline engines, rotating components of electric motors, and hydraulic metering valves.

of this article to recommend specific formulations, but it should be pointed out that factors indicating the usage of any preparation include:

(a) The service temperature that must be withstood by a given film. (As a rule, dispersions with organic or plastic binders are preferable where operating temperatures will be 600 F or less; materials with inorganic or ceramic binders should be used when temperatures will range from about 600 to 2000 F.)

(b) Ability to withstand wear under various loads at different speeds.

(c) Inertness to environmental media. (Special solid film lubricants now available have excellent resistance to such varied fluids as tap water, xylene, dioxane, trichlorethylene, and gas turbine oil. Further, it is possible to apply films that are impervious to differing combinations of these chemicals.)

(d) Compatability with deposition materials. (Virtually all dry film lubricants can be applied to commercially available metals. Therefore, compatability is primarily a problem where it is necessary to lubricate parts made from such nonmetallic materials as plastics and glass; or where dry films are used to prevent damage in the event of improper oil or grease lubrication.)

Careful application is also essential to the successful use of solid film materials. For instance, a lubricant coating can be more satisfactorily bonded to a surface that has been cleaned and roughened.

Spraying is the most satisfactory method of applying solid film dispersions; and where pneumatic finishing equipment is unavailable, readily obtainable spray bombs may be used. Brush applications of the materials cannot be recommended, due to the likelihood of uneven film thicknesses, but dip and roller coating techniques have been employed with good results in some cases.

In the case of dip coating, uniform films have been obtained by tumbling parts in a wire basket following immersion in a lubricating medium.

One of the potentially greatest applications for dry lubricant coatings is in valves, and in this connection valves now being employed by a major Southern California utility can be considered as a good example. Said units require lubricants on their worm gearing to assure easy turning and tight seating, regardless of how frequently or infrequently they may be used.

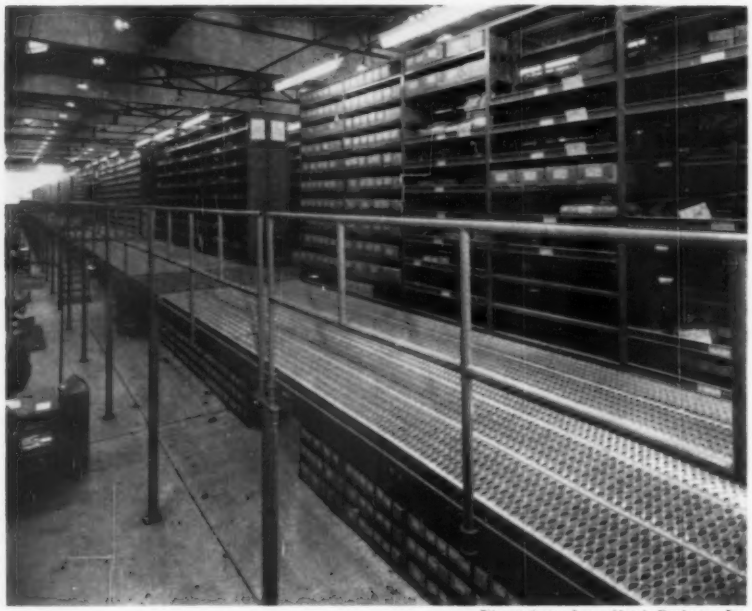
Hinge pins of the types used on the doors of muffle furnaces have in the past been frequently replaced because high operating temperatures made it impractical to protect them against wear with oils or greases. Now, thanks to ceramic-type solid film lubricants, their lifespan is being quadrupled.

Plated ball joint bearings designed for high loads (up to about 225,000 psi) are usually short-lived because conventional lubricants cannot resist displacement well enough to prevent wear due to maximal load friction.

In diecast aluminum support housings for gear trains, solid lubricant coatings have been employed with such excellent results that they are now replacing bushings and sleeve bearings in the components' borings. **End**

Storage Space Problems?
TRY DOUBLE-DECKING

By A. G. MACKEY, Manager, Material Control, American Airlines, Inc.



Illustrations: Lyon Metal Products, Inc.

Fig. 1. Additional space for servicing aircraft was obtained by consolidating 22,500 sq ft of storage area in Hangar No. 3 with the 45,000 sq ft in Hangar No. 4.

INSPECTION and overhaul of American Airlines aircraft and engines routed into Tulsa at established intervals calls for a lot of spare parts. That is why the stores section plays an essential part in the servicing program.

The company had 103,500 sq ft of space devoted to storage of spare parts with an investment in inventory of some 50,000 parts. The two major storage segments were located in adjacent hangars with 22,500 and 45,000 sq ft.

In March of 1955, it became necessary to provide some additional servicing space at this overhaul base because of the increase in types and numbers of aircraft. It was decided that the additional space could be obtained by consolidating the 22,500 sq ft of storage space in Hangar No. 3 in the 45,000 sq ft area in No. 4.

The material stored covered a wide variety in nature and in size. Included were: stationery, catering equipment, engine components, miscellaneous hardware and airframe parts. Sizes ranged from 3/16-in. steel washers to 30-ft wing flaps. There were four major storage methods: steel bin-type shelving, storage racks, self-tiering pallets, and surface control racks.

Process of Elimination

We began by examining each of these groups individually as follows:

a. The steel shelving comprised 1550 standard 3 ft by 7 ft sections in 12 in. to 36 in. depths and occupied 20,400 sq ft. It was immediately apparent that double-decking would result in a gain of 10,000 sq ft. We were advised by the shelving manufacturer that a splice fitting was available for securing the "T" angle uprights of upper and lower sections and that the load-carrying capacity of the uprights was adequate to support the second deck bins and walkways with a maximum load factor of 250 psf.

b. Once the feasibility of double-decking the bins was established, we considered the storage racks. There were a total of 34 double-entry shelf and pallet racks 8 ft wide by 8 ft high by 48 ft long with bulk materials stored to an over-all height of 12 ft. The racks occupied 34,000 sq ft and were serviced by industrial fork trucks with aisle widths ranging from 10 to 12 ft.

It did not take long to recognize

that reduction of aisle widths was the answer. Procurement of tiering trucks would enable us to reduce the aisles to 7 ft and realize a gain of 8000 sq ft.

c. Cube utilization in the self-tiering pallet area left little room for improvement. These pallets were used for storage and transport of engine cylinders and propeller blades and were stacked in solid piles to an over-all height of 12 to 15 ft. Our balance of 4500 sq ft would certainly not be reduced here.

d. It was doubtful, for a time, if we would have any more success in the handling of the surface controls equipment such as flaps, ailerons, elevators, etc. They had been a perennial handling problem by reason of irregular configuration, size, and extreme sensitivity to damage. These items were stored on locally fabricated three-level, cantilever type racks 10 ft wide, 6 ft high, 20 ft long.

Storing Bulky Pieces

The racks, each holding six items, were arranged in line along the west wall of the hangar and occupied 7500 sq ft. They were handled manually in and out of the racks with eight stock clerks required to move the larger units. Extra-wide aisles adjacent to the racks were necessary to prevent possible damage from vehicular traffic.

By a process of elimination, it was finally decided to store them somewhere on the second deck of the bin structure. This was accomplished by adding a 5 ft by 300 ft deck extension and by designing a new storage rack in which these larger items would rest on the leading edge instead of flat.

Now, with an electrified monorail tractor and hoist, one man does the handling job where eight were formerly required. In addition to minimizing cost and damage potential, the new plan gave us the additional 4500 sq ft of unobstructed floor space.

The 10,000 sq ft gained from double-decking, the 8000 sq ft from reducing the aisle width and the 4500 sq ft from storing surface control parts on the second deck of the storage area equalled the 22,500 sq ft we were looking for.

Major cost items for double-decking the storage area were: Steel deck grating, light fixtures, stationary electric lifts, a monorail system, tiering trucks, and surface control racks. Total cost was $70,000 or $3.10 per sq ft for the 22,500 sq ft.

Erection of the double deck bins and grating was, by far, the major expense involved. Prior to installing the decking there were expressions of concern on three counts.

1. The bin structure caused some anxiety as to the duration and cost of the job. The shelving incorporated two features that gave rise to this concern:

(A) The "T" angle uprights were common to the adjacent sections; that is, no one section could stand alone as an independent unit.

(B) The boltless clip/stud shelf support.

Because of this, we imagined that the sections for the second deck would have to be completly dismantled and re-erected in final position.

2. Linked to this problem was the effect the dismantling process would have on the service that the stores section could provide during the transition period. It was feared that there would be a serious loss of efficiency and inventory control while 50 per cent of the bins were being torn down.

3. Last, but not least, was the question as to what effect the completed structure would have on stores headcount and service. In short, would a two-floor operation increase manning or requisition processing time?

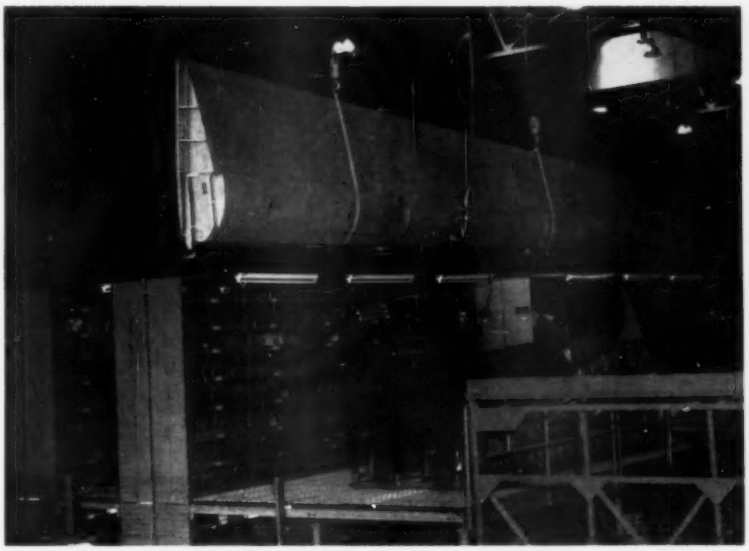


Fig. 2. Flaps, ailerons, elevators, etc., are now placed in a special storage rack. One man, with aid of hoist, handles parts formerly requiring services of eight men.

All these fears were really groundless. With a truck-mounted crane and a 24-ft I-beam spreader bar, it proved possible to raise an entire bank of a 16-bin section, position it over corresponding units on the first floor, and hold it in place while the splice fittings were installed.

There was absolutely no interruption to service since none of the inventory was removed from the shelves. Pending installation of walkways, mobile ladders were used for disbursement of material from the upper sections. The entire installation proceeded without a hitch and was completed well ahead of schedule.

Time studies, conducted several months after completion of the installation, proved that in the areas of both manning and service, one-floor operation has no measurable advantage over the two-floor method. **End**

Cellular concrete, produced by methods comparable to the baking of bread, provides a combination of desirable properties well worth considering. Among them: high strength-to-weight ratio; thermal and acoustical insulating efficiency; incombustibility; high resistance to water absorption; similarity to wood, in workability with hand tools; available in block, slab or panel.

DUROX . . .

A Gas Concrete Building Material For Walls, Floors or Roof Decks

LIGHT IN WEIGHT, structurally strong, high in insulating value, a gas concrete building material is now available to builders. Five years ago, an attempt was made to introduce this type of product to this country from Sweden (see Zeprex — A Versatile Building Material, PLANT ENGINEERING, April 1953, p. 80) but the manufacturing facility was never set up to produce it.

Now, operating under license from the Swedish firm responsible for its development, an American firm is producing Durox—a gas concrete.

Durox is manufactured from finely divided siliceous materials such as sand, fly ash, alum shale ash or blast furnace slag in combination with cement, lime and aluminum powder. These materials, when mixed with water, undergo a chemical reaction that causes the mixture to rise in molds, much like bread. After the expansion is complete, and the material has taken an initial "set", it is cut in a machine with tightly-stretched wires as cutting edges.

After cutting, the material is autoclaved under high pressure steam for a period of 16 to 18 hours.

Size of the "slices" varies: slabs four to eight inches thick, 20 in. wide and up to 20 ft long; blocks 20 in. long, 7½ in. high and four to 10 in. thick; wall panels a full story in height, 20 in. wide and three to 12 in. in thickness.

Various densities, too, are manufactured: in the 30 to 45 lb/cu ft, the material falls into the structural range; between 20 and 30 lb/cu ft, the material is considered insulating.

Nearly as workable as wood, the material can be chopped,

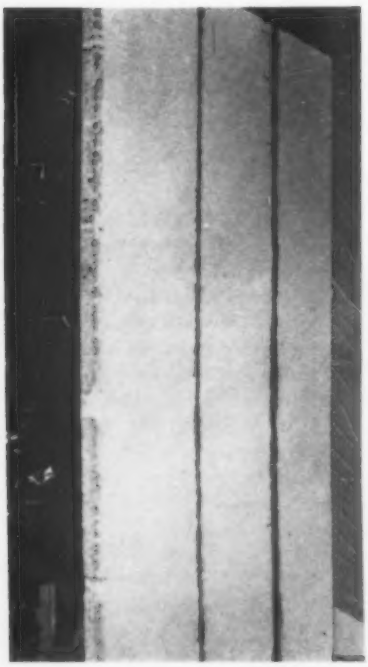


Fig. 1. Three-panel wall section set up to illustrate method of installation.

Fig. 2. Use of Durox blocks as back-up wall for face-brick veneer building. Block provides insulating value required in wall, while providing base for plaster.

sawed, nailed and drilled. This feature makes it an extremely versatile material for field working.

Building blocks are manufactured in densities between 30 and 45 lb/cu ft, the lighter density block being suited for the upper stories of multi-story buildings. Walls of the blocks can be veneered with face brick, to combine the appearance of the face brick with the insulating value of the Durox (K=0.73-1.05). An example of this type construction is shown in Fig. 2.

The block is equally well-suited to use as an exterior wall. Figures 3, 4, 5 & 6 show application of Durox without a face brick veneer. This warehouse, in the Denver area, also uses two other forms of Durox—the precast lintel and the roof slab. The lintel, with box-type steel reinforcing, provides an extremely simple construction over window and door openings; no steel plate or channel is required.

When manufactured for roof and floor slab use, Durox is made in 40- to 45-lb density with reinforcing rod. With a K factor of 0.88 and a deflection of 1/600 of the span, the slabs make an easy-to-install, insulated, waterproof roof or floor. These slabs vary in length from four to 20 ft.

Wall panels of Durox, a full story in height and 20 in. in width, can be used in several ways—as a free-standing wall, as insulation on poured concrete or veneered with face brick to make a complete wall. A cast groove in each side of each panel forms a diamond-shaped keyway when panels are butted together. This is filled with grout, to provide a solid wall. See Fig. 1.

Durox is recommended by its producers for several building applications: non-bearing partitions; structural panels, roof and floor decks, structural block back-up block, partition block and filler block. **End**

Want More Information?

If you do, just drop a line to The Editor, Plant Engineering, 308 East James St., Barrington, Ill., or write "Durox" on one of the postage-paid cards to be found elsewhere in this issue, and drop it in the mail.

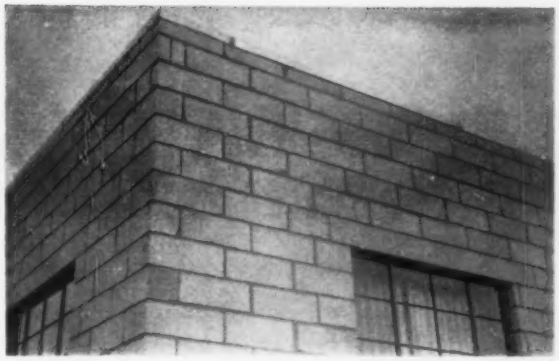


Fig. 3. Exterior of 8-in. block warehouse wall. Note the long pre-cast lintels.

Fig. 4. Blocks are readily field-cut to fit evenly around windows, other wall openings.

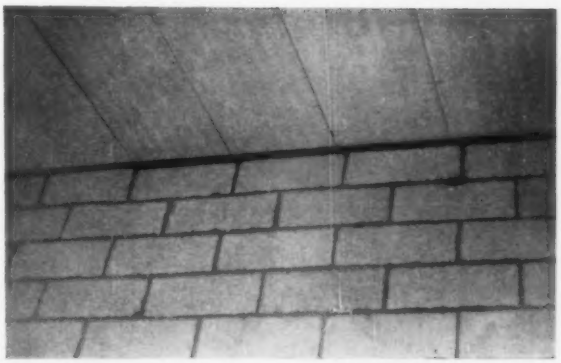


Fig. 5. Interior view of building shows uses of Durox — block walls, panels in roof.

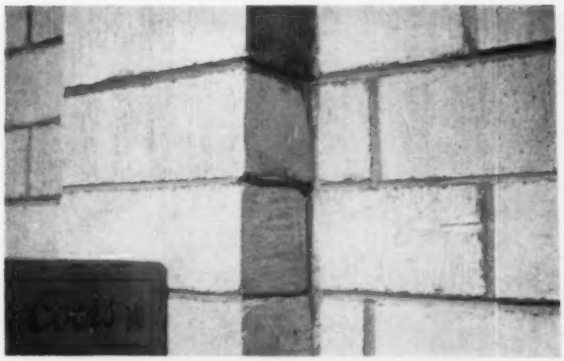


Fig. 6. Closeup of standard eight by eight by 20-in. concrete blocks in building walls.

INDUSTRIAL AIR TUBE SYSTEM
Monitor Guides Carriers to Destinations

FAST DELIVERY of mail, records and other small items is accomplished through a pneumatic tube system in the plant and offices of Automatic Electric Company, Northlake, Illinois, manufacturing subsidiary of General Telephone. The automatic "mechanical messenger," its cargo carriers speeding through nearly six miles of steel tubes at the rate of 25 fps, will deliver up to five pounds of payload to most stations in less than two minutes. This system can handle up to 24 tons of communication in an eight-hour day; there is no accumulation of material, because it is moved in small quantities as it is generated.

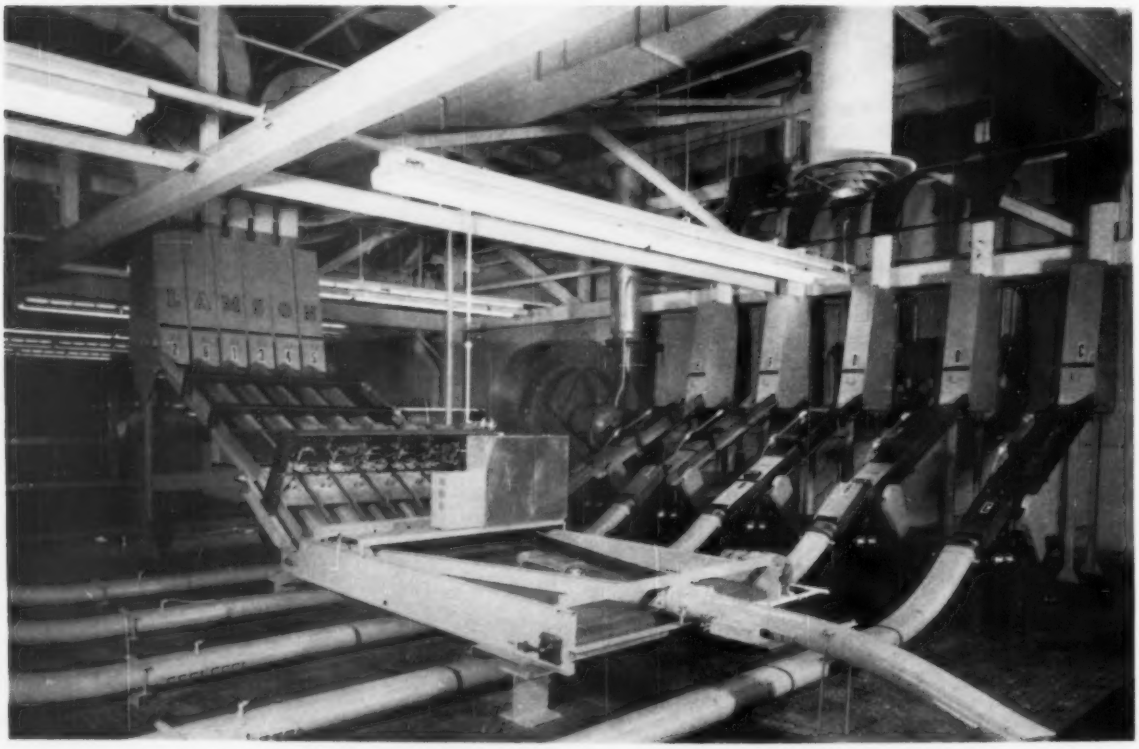
The 4 by 7-in. automatic switch Airtube system is tailored to fit Automatic Electric's requirements in its huge manufacturing sales and research center covering 1,520,000 sq ft of floor area. Thirty-six stations, each equipped with a sending and receiving terminal, are strategically located to provide two-way traffic to all 80 departments throughout the plant and offices. All 36 stations are located on tributaries to six lines which converge as incoming tubes at the system's hub. This automatic switching center (the monitor—see Fig. 1) is located on an elevated platform, where it is out of the way.

Six outgoing tubes originate at the automatic switching center to feed carriers to all receiving stations. Each tube station's address is composed of a letter designating the tube line, plus a number designating the station.

It might be well to discuss a little of the ground work that was done in planning the system. A study was made to determine destination, time and physical characteristics of each piece of correspondence that had to be moved. This indicated a system that would provide physical movement over a wide area, and pneumatic tubes seemed to meet these requirements.

Next, Automatic Electric people contacted eight plants to get first hand information regarding layout and operation, as well as the economies of such a system, from other users of tube systems. They

Fig. 1. Incoming carriers enter chutes from numbered terminals, go through tilt units, over belt into outgoing tube.



found that the average amortization period of the eight systems was 2.3 years. Meanwhile, the survey information was being sifted to provide a profile of the requirements from which the type, size and scope of a pneumatic tube system could be established. It was determined that a certain size carrier would handle 95 per cent of the material, and that the remaining 5 per cent would be of a type that could not be economically handled by any mechanical means, i.e. magazines, directories, accounting ledgers, and so forth.

Paperwork Handled

With this background, a system was laid out to handle 100,000 production control punch cards a month, shipping orders, time cards, drawings and intraplant mail. It was then possible to estimate the tangible savings that a system would effect and the amortization period was conservatively calculated at 2.7 years based on 1956 wages.

While the system consists of 36 stations, the monitor and other basic elements can be expanded to 72 stations by merely adding terminal equipment. The simplicity of the system provides unusual flexibility. Since the carrier is self-signaling, the monitor and the stations self-contained, there is no wiring system between stations or between the stations and the monitor. Single phase 110-v wiring is localized at the stations.

The 120 carriers assigned to the 36 stations are not equally distributed, but are allocated to meet the traffic requirements. The carriers are each branded with a "home" station designation and material is sent as far as possible in a "home" station carrier. The most important advantage of this system is that it insures that the carriers will remain distributed. In the event a carrier is misdirected, the brand becomes a return address.

The automatic central switcher, called the monitor, houses the entire system's "brain," a relay-studded control cabinet designed to route carriers to the appropriate outgoing tubes and to regulate flow so that no traffic jams develop to prevent a carrier from passing through the monitor every three seconds. Because it responds to changing traffic conditions by giving priority to the line carrying the heaviest traffic, this switching center is known as the "demand type monitor."

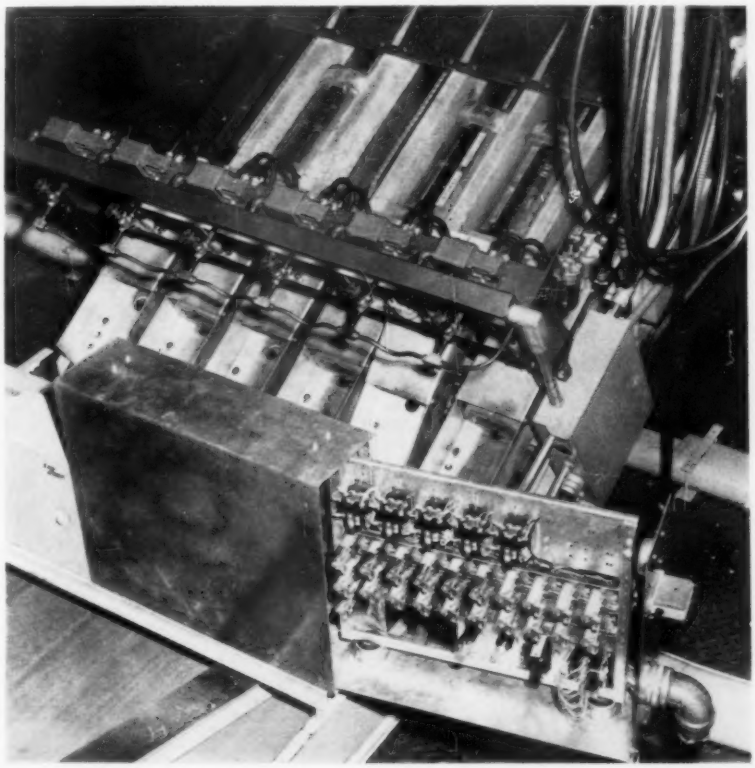
In addition to the control cabinet, the major components of the monitor include: six incoming tubes, identified numerically; a large centrifugal exhauster, capable of moving 2200 cubic feet of air per minute—this creates the vacuum for all six lines incoming to the monitor; a belt conveyor; and six outgoing tubes. An unmarked line carries all outgoing carriers to individual tubes. Those addressed to the five alphabetically marked outgoing tubes are routed accordingly; the unmarked tube not only routes carriers to each of the "lettered" tubes but continues on to serve the Customer Order Service Department, and the mail room. The mail room, located at the end of the line, receives all incorrectly addressed carriers for corrective action. Before a carrier is dispatched from any tube station, it is "addressed"

Fig. 2. Printed conductors on carrier sides and dials serve in addressing.

by means of two dials located in the head of carrier. See Fig. 2. Dials select printed circuit components on the carrier's sides. Carrier is then placed in the sending inlet.

In a matter of seconds, the carrier drops out of one of the monitor's incoming tubes into a chute. As it slides down the chute, it

Fig. 3. Panel holds relays for address storing and controlling deflector arms.



passes under two bars from each of which protrudes, into the path of the carrier, a limit switch trip wire. If only one of these switches is operated at any one time, the flow of carriers to the belt conveyor is normal. If, however, both switches are held in contact at once—this is the case during a period of heavy traffic during which four or more carriers are held in the same chute at one time—then incoming traffic from that line would be handled prior to that from the other incoming lines until the excess has been taken care of.

At the end of the chute, the carrier comes to rest against a stop where another limit switch is operated. This switch is tied to a stepping switch which is located in the control cabinet. See Fig. 3. The stepping switch sets up a circuit to operate a rotary solenoid which lifts an "address reading" brush block against the under side of the carrier. The address is stored in slow operating relays; a solenoid valve operates an air cylinder to lift the hinged carriage and dump the carrier onto a moving belt conveyor. The carrier, riding the belt, hits and operates a limit switch which cancels out all relays except those storing information, and at the same time releases the carriage to return to its normal position.

The carrier, traveling over the belt, is guided into the mouth of the single outgoing tube. Upon entering this tube, another limit switch actuates a contactor relay (in the control cabinet) which operates an arm to deflect the carrier into the proper distribution tube. As the carrier is being deflected to the addressed tube, it operates another limit switch, cancelling out all relays in the control cabinet that have remained in operating position.

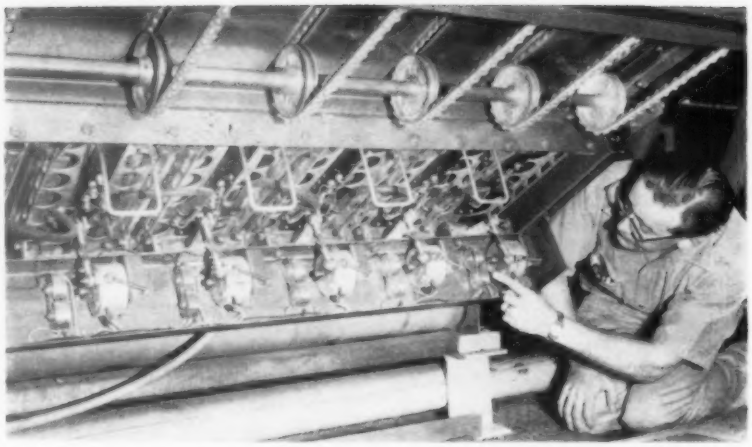


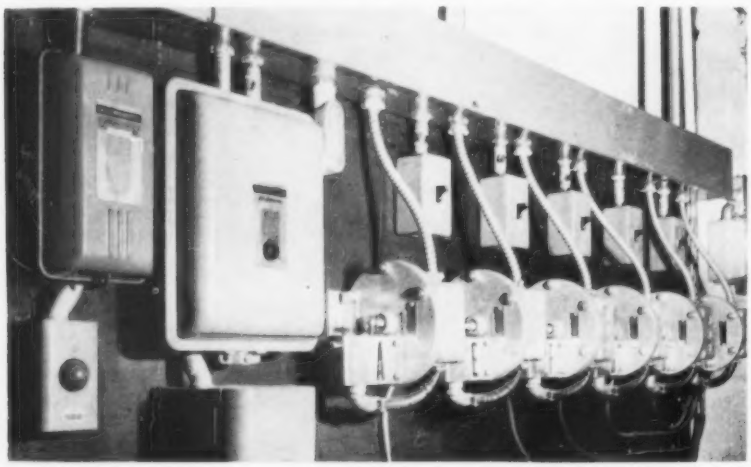
Fig. 4. Rectifiers, and rotary solenoids for releasing spring-loaded carriages.

Carriages associated with outgoing tubes automatically tilt up at predetermined intervals. Those feeding tubes "B" and "C", the busiest tubes, tilt up at 10 second intervals. All others tilt up at 15 second intervals; because these tubes are longer, and serve more stations, they need the additional time.

Upon approaching an addressed tube station, the carrier passes another set of brushes. These contact the dialed circuit components on the side of the carrier, and if a circuit is completed, a solenoid is activated. A deflecting arm is raised in the path of the carrier, diverting it into the station. When the carrier approaches a station not dialed, no circuit is completed, no solenoid is activated and the carrier passes through.

While all tubes coming into the monitor use in common the large exhauster mentioned before, outgoing lines are provided with their own exhausters. The unmarked tube, serving the mail room and the Customer Order Service Department, and a relatively short outgoing tube serving seven stations on both floors of the office area, use a common exhauster drawing 700 cfm. Other tubes are served by 450 cfm units. In addition, the length of tubing comprising one of the lines makes it necessary to have a booster unit, drawing 700 cfm, in the middle of that line.

Fig. 5. Vacuum switches which react to pressure drops to close blocked lines.



To turn the entire system "on," or "off" from the monitor location and to eliminate the need for wiring each of the remote exhausters serving the outgoing lines to a master switch at the monitor, vacuum switches were located at the originating end of each tube incoming to the monitor. When the main exhauster is turned on and when air flow toward the monitor reaches the proper level, a switch at each tube operates to turn on the exhauster installed at the terminating end of the associated tube.

Provision has been made to

(Continued on page 156)

STEAM TRAP SELECTION CHART

4. Determining Condensate Formed In Coil-Type Space Heaters

By WM. G. STEINMILLER, Research Engineer, Yarnall-Waring Co., Chestnut Hill, Philadelphia

UNIT HEATERS, radiators, pipe coils and similar space heating equipment frequently use steam as their heat source. When computing the size of trap necessary for coil-type heaters you must know how much condensate is produced by the heater during a given time. The accompanying chart permits easy solution of this problem. To use the chart all you need know is the heater output in Btu per hour and the pressure of the steam. The example below shows how to use this chart.

Example: A unit heater rated at 600,000 Btu per hr is supplied steam at 150 psig. How much condensate is formed in the heater?

Solution: Enter the chart on the left at the rated output of 600,000 Btu per hr and project to the right to the steam pressure of 150 psig. At the intersection with the central sloping scale read the condensate load as 700 lb per hr.

No matter what the inlet and outlet temperatures of the air are, this chart can be used for any coil-type steam heater. It is generally best to enter the chart with the rated output of the heater, if this is the maximum load expected in service. When a heater is expected to operate at an overload, use the overload rating when entering the chart. The intent in both instances is to enter the chart with the maximum output expected of the heater. Then the maximum condensate load will be determined and a trap of the proper capacity can be chosen.

By entering the chart at the steam pressure on the right and projecting through the condensate load in the center the heater rating can be found on the left.

Example: A unit heater operating at 15 psig discharges 200 lb per hr of condensate. What is its heat output?

Solution: Enter the chart on the right at the steam pressure of 15 psig and project to the left through the condensate load of 200 lb per hr. At the left read the heater output as 189,000 Btu per hr. Note that this is not the heater rating, unless unit works at rated output.

This chart is based on the relation: $C = B/L$, in which C = condensate load, lb per hr; B = heater output to produce the condensate load, C, Btu per hr; L = latent heat of the heating steam at the trap pressure, Btu per lb. **End**

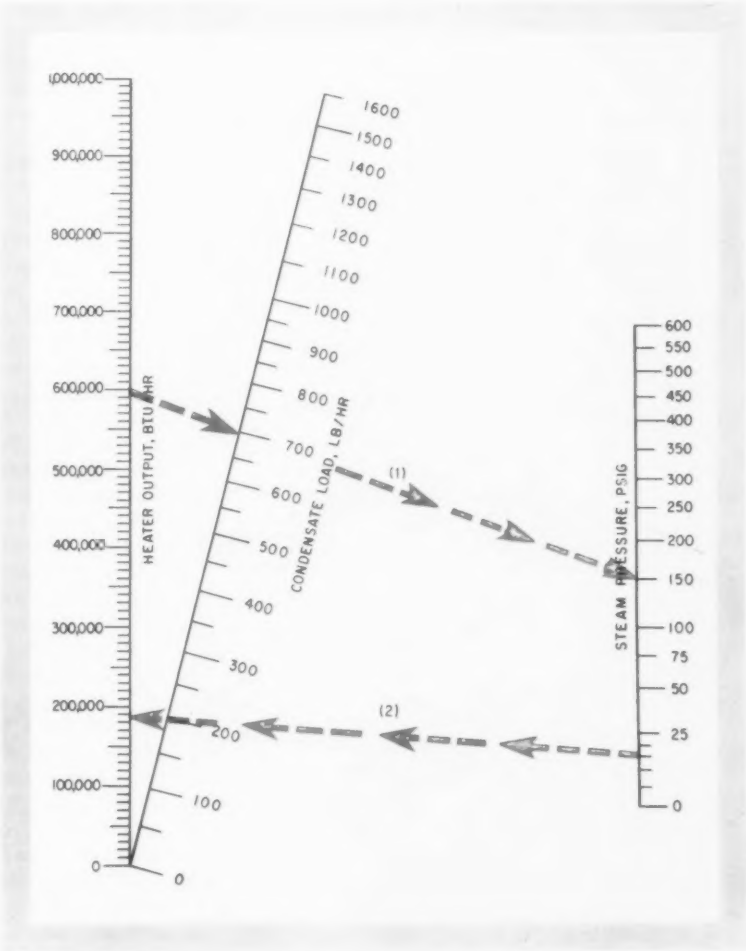
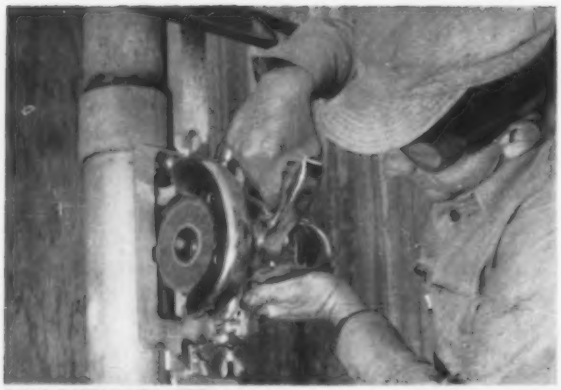


Fig. 1. Chart can give ratings and condensate loads for various heat outputs.



CUTTING WITH

Once used only for small jobs in the plant, abrasive cutting may now be the answer to your cutting problems in maintenance and construction work

RECENT DEVELOPMENTS in abrasive wheels and cutting-off machines have made abrasive cutting increasingly practical and economical. The development of power saw-type portable machines and portable chopper-type machines, together with new and improved abrasive wheels has been responsible for this increased activity, especially in construction and maintenance work.

Let's for a moment discuss what is meant by abrasive cutting. The cutoff wheel is a thin grinding wheel. Because of the narrow wheel face and the high unit pressure against the work, it cuts through the work instead of grinding the surface. Since grinding is actually a chip making operation, the thousands of sharp abrasive particles act in much the same fashion as the teeth of a saw. However, the cutoff wheel cuts 12 to 20 times faster than conventional saws because of the greater number of "teeth" and because of the higher speed.

An abrasive cutoff wheel is a self-sharpening tool. As it wears down in diameter, new and sharp abrasive particles are exposed on the cutting face. In a properly selected wheel, wear occurs only when the individual grains of abrasive on the surface have become dull, causing a "drag" against the work which pulls the dulled grain out of the bond and allows the sharp grain beneath to begin working.

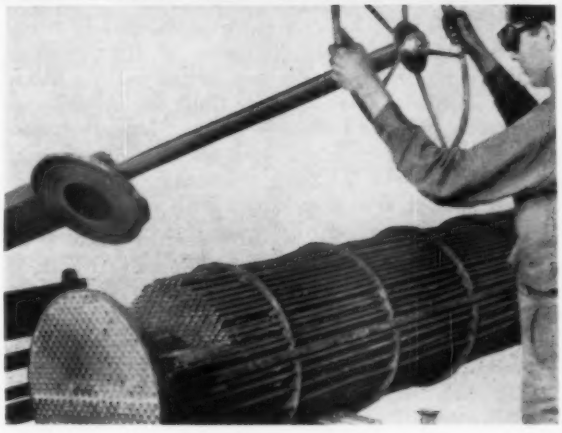
An unusual use of a portable cutoff machine was for the salvaging of a $1300 electrical cable from a fire-gutted Texas plant. The cable was inside a conduit which had a ¼-in. wall thickness. Burning or cutting would probably have ruined the three-conductor cable. The solution was to make two cuts, the length of the section of conduit along each side. The first cut with the abrasive disc went half way through the conduit wall. The next cut left about 1/16-in. of wall thickness which was then knocked out. See Figs. 1 and 2, top left illustrations.

The same type of machine solved a maintenance problem for a Midwest firm. This plant had several storage sheds with corrugated steel sides. Over the years, the bottom edge had rusted away through contact with ground moisture. It was decided to cut away the rusted-out portion and install concrete footings to seal the bottom of the sheds.

Cutting away the bottom proved to be a real problem. A friction saw cut about 18 in. A saw with carbide inserts cut 350 in. and gave a ragged cut. Since each of the sheds was 1100 ft around, neither of these methods was practical.

ABRASIVES

By ROGER N. PERRY, Jr.
Technical Service Section,
Norton Co., Worcester, Mass.



The final solution was abrasive discs mounted in a portable power saw. A guide was used to direct the wheel along a straight line above the rusted-out portion. Thirty wheels were required for each shed.

In June, 1953, a tornado hit the Worcester, Massachusetts, area. Directly in the path of the twister was the newly-completed Norton Company's Grinding Machine Division plant. In seconds, most of the roof was blown off.

One of the first requirements in getting the plant back into production was the replacing of the steel deck roofing. Abrasive discs in portable saw-type machines were used extensively for cutting away damaged decking and fitting in new pieces, also for cutting plastic and corrugated siding. See Figs. 3 and 4, lower left illustrations.

For cutting pipe in the field, the Wallace Supplies Manufacturing Company of Chicago has developed a portable cutoff unit which clamps to the pipe to be cut. The unit which mounts the wheel is rotated around the pipe on a circular frame.

The petroleum processing industry uses many heat exchange units which consist of nests of tubes. In this industry, such coils are known as "bundles." Retubing the bundles is a major maintenance problem. To facilitate the removal of old tubes, the Ohmstede Machine Works of Beaumont, Texas, uses a 16-in. reinforced cutoff wheel with an offset hub, mounted on the end of a long arm. Tubes are cut off close to the tube sheet, Fig. 8, lower right. By rotating the wheel head 180 deg, the tubes can be cut off close to the opposing tube sheet at the other end. The ends of the tubes are then easily knocked out and new tubes installed.

In the logging industry, great quantities of wire rope are used. It has become standard practice to cut this rope to length with an abrasive wheel in a chopper-type machine. See Fig. 7. Abrasive cutting leaves no frayed ends. Clamping the work securely is important in an operation like this. A maker of wire-reinforced hose had a similar problem and by selecting the proper wheel, he cut through the rubber hose and the wire reinforcing quickly and cleanly.

In the construction field, there are many materials which must be cut on the job. Brick, stone, glass-reinforced materials and concrete are some. Another major use is the cutting of refractory materials for relining furnaces and kilns. See Fig. 5.

Brick masons, using cutoff wheels on masonry

saws can cut bricks to exact size for corner joints, window ledges, etc., where the broken edge left by a hammer and chisel would not be acceptable. The same abrasive saw readily cuts concrete blocks, stone, or any masonry material.

Portable saw-type machines with cutoff wheels make easy work of removing old mortar prior to repointing masonry work. See Fig. 6.

Uses for Diamond Wheels

In many cutoff jobs in the construction field, metal bonded diamond wheels are proving more economical to use than the reinforced wheels of conventional silicon carbide abrasive. If the number of cuts to be made is high enough to justify the higher initial cost of the diamond wheel, substantial savings are possible. Continuous strip concrete on highways requires "cutting" with a diamond cutoff wheel to confine eventual cracking to the desired location.

The use of reinforced abrasive wheels is strongly recommended on any portable cutting-off operation. Reinforcing layers in the wheel provide resistance to bending which helps the wheel stand up under the normal side pressure which may develop in such work. The wheel can break under abusive treatment.

When in doubt about the need of reinforced wheels, here's a handy rule of thumb: If the wheel cannot be held rigidly, or if the work cannot be held rigidly, a reinforced wheel should be used.

Because reinforced wheels cost two to three times as much as non-reinforced, there is a normal tendency on the part of cost conscious people to use the non-reinforced if possible. However, excessive wheel breakage and possible injury to personnel are likely results.

Wheel selection is dependent upon the material to be cut, the finish requirements (if any), the machine to be used, and production requirements.

In general, aluminum oxide abrasive should be specified for all metal cutting. Silicon carbide abrasive cuts best in non-metallic material. Steel-reinforced concrete is a good example. In a case such as this, the wheel should be used which is most suitable for the material which makes up the greatest percentage of the mixture. In this case, a silicon carbide wheel.

Many materials which can be cut with silicon carbide wheels can be cut more economically with diamond cutoff wheels. In spite of their higher initial cost, the longer life and better cutting qualities of diamond wheels justify their use in working with stone, glass and other ceramics. They are suited to use in chopper-type machines which can be moved about in the field. A word of caution . . . diamond wheels should always be used with coolant. They should never be used to cut steel, nor should they be used in hand-held, portable saw-type machines.

For most portable operations, the rough sided reinforced wheels are more satisfactory than smooth sided wheels. The rough sides are molded into the wheels to provide cooler and freer cutting.

Resinoid bonds are generally used in making wheels designed for the cutting-off operations described in this article. These wheels are used primarily without coolant. For chopper-type machines, rubber-bonded wheels are also available, and in most cases these are used with coolant. Where finish or production requirements are of importance, your dealer's suggestions will be helpful.

Grit size and grade depend upon the work to be done. While it is possible to generalize, it is best to follow the wheel manufacturer's recommendations. Hard wheels are usually used to cut soft materials and soft wheels on hard materials. For rough cuts or fast cuts, coarse grits are generally selected for ceramics, foundry work, and construction materials. Finer grit is recommended for clean cutting of soft metal tubing, tool steel, etc.

In general, abrasive cutoff wheels can be used on any machine designed for use with metal saw blades with the exception of the table saw. Abrasive wheels should not be used on table saws because it is almost impossible to install adequate safety guards.

Before a machine designed for metal saws is used with abrasive wheels, it should be checked for speed, flange diameters and design of safety guards required for use with abrasive wheels. **End**

How To Use Abrasive Wheels

Mounting Wheel

1. Select correct wheel for your operation. Inspect for cracks. Do not use cracked wheels.
2. Never exceed maximum safe speed shown on wheel.
3. Never alter hole in wheel or force wheel on spindle.
4. Use clean matching flanges at least ⅓ wheel diameter.
5. Use one clean, smooth blotter on each side of wheel under flange.
6. Tighten nut only enough to hold wheel firmly.
7. Adjust wheel guard and put on safety glasses before starting wheel.

Using Wheel

1. Stand aside and allow wheel to operate one minute before starting cut.
2. Use cutoff wheels on face only. Never grind on corner or flat side.
3. Support and guide grinder and work rigidly to avoid cramping wheel in cut.
4. Make contact without "bumping" or impact.
5. Make straight cuts only. Never twist or bind wheel in cut.
6. Never force wheel so that motor slows excessively or stalls.
7. Remove and protect wheel when not in use. Never lay portable grinder down so wheel contacts any surface.

Fig. 1. Superstructure provides flexible tray arrangement.

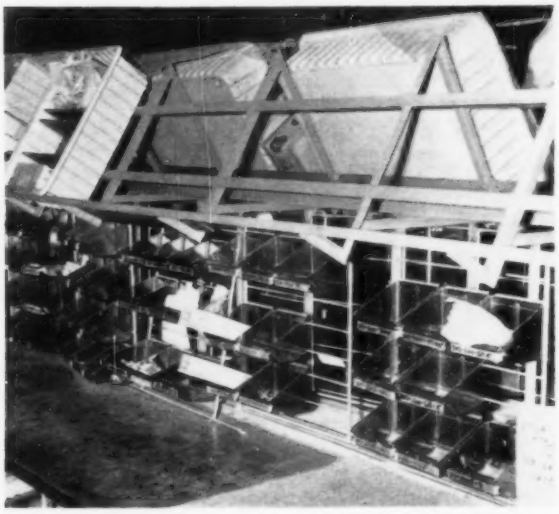


Fig. 2. A-brackets are faced with strap iron, holding bar.

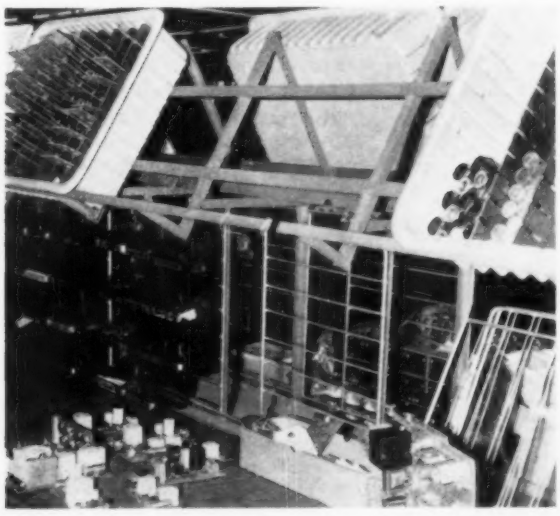


Fig. 3. Work trays sit loosely against A-frame above bench.

Bench Superstructure

Puts Small Parts at Fingertips

By R. E. SALRIN, Chief Production Engineer
Lear Inc., Santa Monica, Calif.

WHEN THE LEARCAL Division of Lear Inc., Santa Monica, Calif., producers of precision electronic equipment for aircraft, built a new plant, their plant engineers designed their own method of workbench parts supply. It has proved effective in keeping parts handy to assembly bench workers, and has provided additional advantages as well.

The installation consists of a strap and angle iron welded superstructure running between two rows of facing assembly workbenches. Over-all height of the superstructure is 30 in. The upper portion of this superstructure has A-shaped brackets which are faced with strap iron and a holding bar protruding outward from each lower leg of the A. This provides a slanted surface for the 16-in.-by-24-in. plastic trays which hold large parts. See Figs. 2 and 3.

These plastic trays are provided with indentations along the interior of both sides and both ends so that masonite dividers can be inserted in any desired position. The dividers are slotted in such a way that they will fit over each other crosswise. Thus the plastic tray can be divided into a number of square or rectangular box cubicles into which the stored parts will rest nicely.

This A-frame superstructure is held aloft by two 20-in.-long angle irons under each A-shaped bracket. These verticle angle irons in turn provide attachment points for welded grids which are mounted vertically against them. The center grid at each assembly station is mounted flush and flat by means of hooks against the superstructure.

The two outside grids at each assembly station (three grids for each station) are mounted so that they hinge outward from the center grid, thus bringing the parts boxes nearer to the assembly worker. The cross members in these grids are used for attaching the small 4-in.-by-4-in. plastic parts boxes. Each grid is 12 in. wide.

The small plastic boxes hung on the grid cross members are used for storing smaller parts such as resistors, capacitors, transistors, etc., and for miscellaneous hardware. A small clip on the front of each plastic box holds a card denoting the parts number it contains. Both the large plastic trays and the small plastic boxes can be removed or installed along the superstructure as required. The number of parts on hand at all times is visible at a glance. Regular parts dispatchers move along the assembly bench lines at certain intervals to replace any of the parts stock that may be running low. **End**

Corrosion-control specialist in a West Coast refinery takes a spot reading to determine the internal corrosion in process equipment. The electronic instrument, using two probes, can detect a corrosion change of a millionth of an inch.

INTERNAL CORROSION MONITORED

Quick Instrument Readings Tell What To Do

REDUCING THE cost of controlling internal corrosion in process equipment and pipelines may now be possible because of a new electronic measuring technique which has been developed.

Internal corrosion is generally controlled by the addition of inhibitor chemicals. These serve to protect the metal surfaces against attack. The exact amount of inhibitor to do the job has been difficult to determine, however. Usual method has been to measure the weight loss of small metal coupons after they have been exposed to the corrosive atmosphere for several days, weeks, or months. The amount of inhibitor is varied to find a safe corrosion level.

The new technique provides a daily, or even an hourly record of corrosion attack. Capable of detecting as little as a millionth of an inch of corrosion, the method gives engineers a way of judging the effect on corrosion, almost immediately, of even small changes in process conditions or inhibitor concentrations. Within days they can determine the optimum conditions that give minimum corrosion.

In one field test, for example, addition of an inhibitor reduced the corrosion rate by 75 per cent within a day and a half. The curve then flattened out, however, and engineers suspected that the specific dosage was not actually entering the system. An inspection revealed that the pump metering the inhibitor into the system was at fault. Once this was corrected, the corrosion-rate curve resumed its downward drop, stopping at five per cent of the initial rate.

The new measuring technique also allows plant engineers to run rapid comparison tests between competitive inhibitors, thus permitting them to choose the compound that will provide the maximum protection at minimum cost.

This corrosion-measuring method utilizes special "probes" consisting of two elements made from the same type of metal used on the processing equipment, one exposed to the corrosive environment, the other protected by plastic or ceramic.

As the exposed element corrodes, its resistance increases. By using a special instrument which measures the resistance ratio of the exposed element to the protected element, a direct indication of corrosion is obtained. Since both elements are at the same temperature, there is no chance that temperature variations will affect the results. **End**

Want More Information?

If you do, send your request to The Editor, Plant Engineering, 308 East James St., Barrington, Illinois, or write "Corrosometer" on one of the postage-paid cards in this issue.

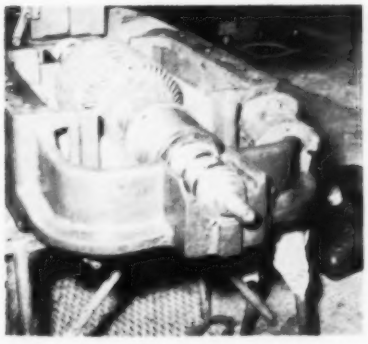
CONVERT TO BALL BEARINGS?
Inspection and Repair Costs Can Be Reduced

By LLOYD McWILLIAMS, Maintenance Supervisor, Shawinigan Water and Power Company, Quebec

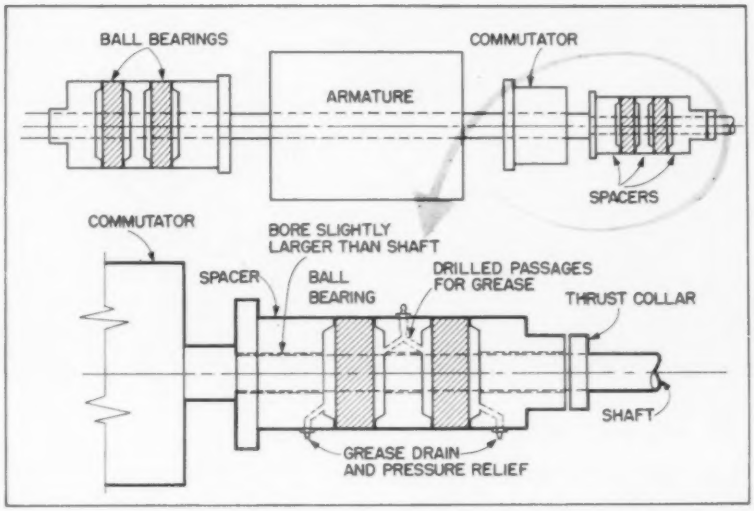
MANY of the older direct-current motors and generators had their stator frames cast in two halves. This type of construction has many advantages from a maintenance point of view as it is a simple matter to lift off the top half to inspect or service the machine.

Most of these machines have sleeve bearings of bronze or babbitt which are a constant source of trouble. Oil from the bearing housing seeps along the shaft and then on to the commutator, resulting in commutator sparking. If this excess oil is not removed at periodic intervals, considerable damage to the commutator may occur. Oil on the armature and field windings resulted in deterioration of the insulation and in short operating life.

In addition, these sleeve bearing machines required frequent inspections to determine oil levels and addition of oil when required. In order to reduce the very high maintenance costs on these machines, it was decided to eliminate the oil entirely by modifying the machine to accept grease-lubricated ball bearings.



Finished ball bearing assembly ready for bearing caps that hold it in place.



Spacer detail used in typical conversion from sleeve to ball bearing operation.

In this example, we will show how an old direct-current elevator motor with sleeve bearings was converted, at little cost, to ball bearing operation. Ball bearings must be selected to suit the shaft size, although a slight cut on the shaft to accommodate a certain size bearing can be considered. In this example, two bearings are used at each end of the shaft. This permitted the selection of smaller bearings that would fit into the available space with little change.

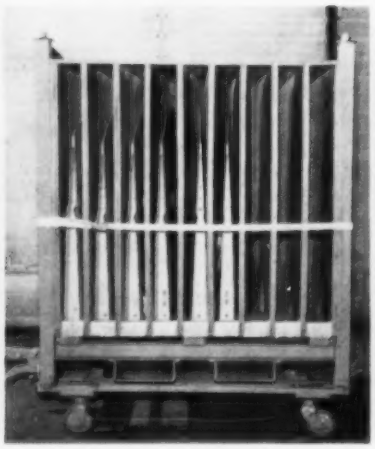
Fortunately, these old machines have plenty of material in their shafts and housings as it was necessary to bore out the bearing housing to provide room for the new ball bearings and the mild steel filler sleeves. The lower half of the stator frame was set up in a horizontal boring mill. With the original bearing caps in place, a fly cutter was used to bore out the bearing housing to the desired diameter. This was sized to make an interference fit on the outside diameter of the bearing.

Different machines will, of course, require different arrangements to accommodate the necessary filler sleeves. These sleeves are bored so that they do not rotate with the shafts and are tightly clamped by the original bearing cap. The sleeves are drilled to permit entry and exit of grease and also serve to protect the bearing from contamination.

Over a year has elapsed since the first motor was revamped in this fashion, and up to this date no difficulty has been experienced. Elimination of hand oiling and frequent inspections required have more than paid for the cost of this conversion work. **End**

THIS MINIATURE RAILROAD SYSTEM

More than 400 pieces of "rolling stock" are used on Convair's miniature railroad system that moves approximately 300,000 items through the plant daily, saving much work and time in handling



MATERIALS HANDLING experts at Convair (San Diego), have developed a miniature "railroad system" with some 400 pieces of rolling stock to assist in the manufacture of the supersonic jet airplanes.

Any increase in handling efficiency is a money saver, because from 50 to 60 per cent of the cost of any item is directly traceable to the expense of handling for about 90 per cent of the time a part has spent in the manufacturing process consists of physically moving the material or part. The remaining 10 per cent has been in actual manufacture.

Custom-built racks, designed to handle anything from small tools to the husky titanium shrouds for jet engines, were constructed for use on small flat cars with casters that are permanently sealed and require minimum maintenance.

Two types of racks were built—one with adjustable shelves for small parts and the second, a basic section rack with special dunnage constructed for the size and shape requirements of larger parts.

The adjustable-shelf racks normally are operated with four pans to present more room and adaptability to parts needs. They can be expanded to an eight-pan operation for smaller unit handling.

Principal uses of the adjustable-shelf racks are in machine shop and sheet metal departments of Convair-San Diego's Plant II where the racks are brought by "train" right up to the operator.

Less Handling

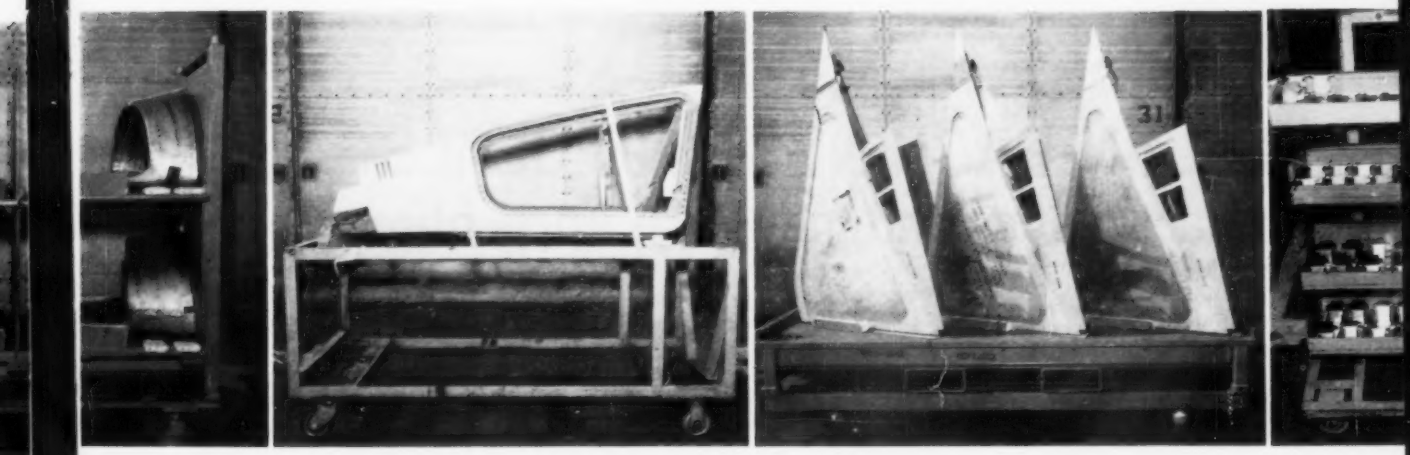
With the rack system, workers no longer have to bend over to pick up a part from a tub, use hand-lift jacks to move full loads or depend upon the availability of a fork lift truck to shift full loads of empties. When the worker completes the machine operation on each part, he puts it back in an empty pan on the same rack. Under the old system, the parts went from tub to machine bench and then were returned to the tub only when all parts had been worked and the tub was empty.

This method applies not only to machine operations but also to inspection and other departments using the rack system. When the operator completes his work on the parts, the rack is wheeled to the next station of work.

The conveyor rack system shortly will be used on a "piggy-back" basis between Convair-San Diego's new Rose Canyon warehouse and Plant II, some seven miles apart. First shears and saw operation on large stock will be at Rose Canyon where stock is cut into small pieces to eliminate handling of full-size sheets and "cut offs" in the shop. Then the pieces will be loaded on racks, wheeled onto trailer trucks and transported to Plant II where they will be fork-lifted off and taken by "train" to the departments for further work. Plans

MOVES MATERIALS FOR CONVAIR

By VINCENT F. CERNUTO, Chief Manufacturing Control, (San Diego) Convair, Div. of General Dynamics Corp.



have been made at Plant II to construct a loading dock which will eliminate the fork-lift routine.

The adjustable-shelf racks are convertible into two other uses: 1. by removing the arms for the racks and replacing them with metal fingers, long, slender parts can be transported in large numbers by stacking them upright in the racks; 2. the fingers also are adaptable to holding large castings—again a stoop-and-lift saver for employees.

Use of the basic section racks is confined principally to assembly departments for transporting large and expensive components such as titanium shrouds, tail cones and wing tips without damaging them. Design of the dunnage on each basic section rack is for a specific component.

The mobile racks are replacing, in large part, the stationary storage racks wherever enough of the former are available. As parts are received or manufactured, they are wheeled to the specified site and stored there on the racks until used. In effect, the racks serve a three-fold purpose—storage, in-plant transportation and off-site shipping from vendors.

Trains Haul Salvage

Two other types of "railroad systems" are in operation at Convair-San Diego. One is in the maintenance salvage department which uses a different-type flat bed trailer to haul trash and scrap metal. This train circulates through Plant II daily. Another "trailer train" handles many thousands of small parts. It is operated from a routing center where parts are segregated on the trailer train according to the building and section as reached on the regular route. The trailer train makes two runs a day throughout the factory—a second trailer being filled while the first one makes its rounds. It also picks up and drops off any conveyor racks which are ready to go.

Because of the mechanical efficiency of the "flat cars," there is almost no limit to the length of the train—up to 300 ft have been worked without difficulty. A gasoline tractor (known as a "jeep" to Convair materials handlers) is used for major train operations while an electric "pony" is the power source for odd job hauls like small tools, small electrical harnesses and cleanup.

Materials handling in the electric bench area of Convair-San Diego's Plant II has been improved with the use of large plastic "tote" pans which nest and stack well. These are moved from assembly table to assembly table on hand carts. Use of plastic tote pans eliminates rusting and continuing refurbishing of the old metal pans and prevents contamination and damaging of parts experienced with metal containers. Approximately 300,000 items are moved daily through the plant. **End**

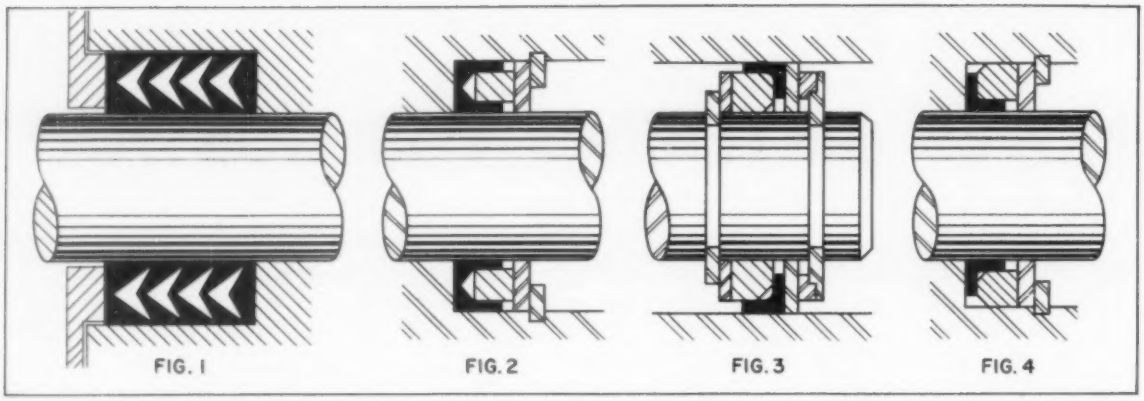


FIG. 1 FIG. 2 FIG. 3 FIG. 4

Four types of Teflon packings shown are, left to right: the Vee packing, U packing, L cup packing and the flange packing

TEFLON PACKINGS AND SEALS—
Characteristics and Industrial Applications

By E. C. BERTOLET, JR., Asst. Chief Engineer, United States Gasket Co., Plastics Div., The Garlock Packing Co.

TEFLON PACKINGS are ordinarily used in unusual applications. This material is becoming well known for its resistance to most chemicals, as well as its heat resistance and extremely low coefficient of friction. As a result, many of the applications require special engineering and cooperation on both the part of the producer and consumer of the packings so as to come up with the proper "package" which will do the required job.

As a guide to determining where you can employ these packings in your plant, following is a description of the packings, characteristics of each, and where they are used in industry.

Solid Teflon packings in the form of square cross section rings or bushings have been used in applications where relatively little motion or extremely low surface speeds are involved such as might be found in hand-operated valve stems and the like.

Packings such as this are not conducive toward conformation to the mating parts, require excessive gland pressure or preloading and are subject to problems almost directly proportional to the temperature cycles involved in service due to expansion and contraction problems.

This type packing, however, has been satisfactory for use where long standing periods require that the packing will not adhere or weld itself to mating parts as so often occurs with other conventional packings.

The shape of "Vee" packings makes them conducive to sealing with the use of multiple sealing lips and is usually used in stacks of two or more pressure rings. Due to their shape, it is usually necessary to provide proper seating of the sealing rings through use of male and female adaptors, either made of Teflon or built into the packing space. See Fig. 1.

The Vee ring is the type most often used as external seals where leakage is not permissible and consequently the added cost of multiple ring installations must of necessity be tolerated.

Nearly all Vee ring installations are utilized in reciprocating type service such as on piston rods or plunger packings. They are occasionally used on "inside" packed applications such as pistons, however, their space requirements and complications involved in installation (such as two and three part pistons) rule them out on an economic basis excepting those wherein low leakage losses are demanded.

Very few applications of Vee rings can be found on rotary service (and then only at low shaft speeds) due to lack of heat dissipation properties of Teflon and lack of lubrication of mating parts due to the good sealing properties of the rings.

The use of Teflon Vee rings dictates some attention to general principles already in effect in the packing field such as smooth mating parts, low clearances as pressures and temperatures increase and even reinforcement between pressure rings at extremely high pressures.

A finish of eight to sixteen microinches is preferred for all moving parts in contact with Teflon packings and concentric grinding grooves should especially be avoided where possible. Where pressures are over 1000 psi, diametrical clearances of metal parts should not exceed 0.002 in. per inch and less is desired as diameters increase. Too large clearances are conducive to premature packing failures due to distortion and extrusion of the original Teflon form.

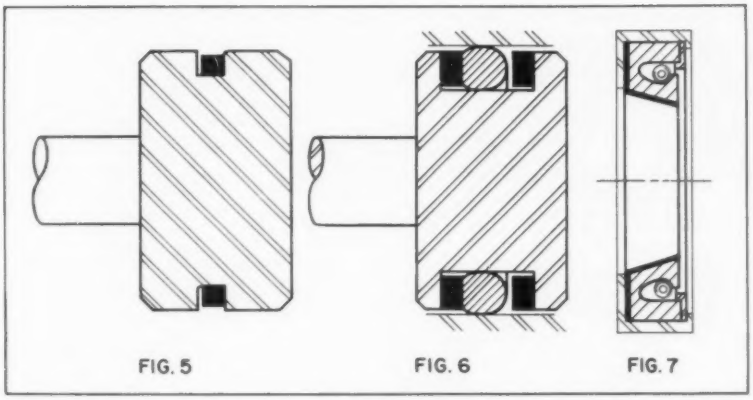


FIG. 5 FIG. 6 FIG. 7

Illustrated, left to right, are Teflon piston ring, backup ring, shielded oil seal

Some experimental sets of Vees with alternating Vee-shaped metal rings between each Vee have repeatedly been tested satisfactorily to pressures in the range of 65,000 psi. The Vees should also be especially designed where low pressure sensitivity is required. Thinner walls and a thinner hinge at the point of the Vee provide more sensitivity and reaction to low pressures but this type is not too good for higher pressure service due to tendency toward distortion and actual splitting at the hinge section.

For services requiring long pressure ranges, it can be seen that a compromise in design may be necessary to combine some semblance of sensitivity with ruggedness. Due to the length of Vee packing sets and the travel required of preloading devices, this purpose is best served by use of springs.

Loading rates are usually best worked out on each individual installation and should be selected on basis of best over-all performance.

"U" cup packings may be considered as a modification of a Vee packing, however in all cases this type packing is used as a single ring and does not require adaptors per se due to the squareness of their contour. U cups are nearly always square on the base and as such require only simple shaped packing recesses.

Packing preloading can take place usually through use of simple rubberlike rectangular rings which apply a resilient spreading action to the two lips and at the same time are capable of sufficient hydraulic distortion to provide suitable sealing action despite variations in parts sizes required for manufacturing tolerances of all parts in question. See Fig. 2.

Resilient filler or spreading rings can be used due to the limited travel required in single ring sealing applicatons. Teflon U cups, being single ring seals, usually do not have the positive sealing action of Vee rings and as such have been used up to the present time as internal seals where some leakage or blow-by is permissible. Small U cups have been used commercially in service from −40 F to 300 F at pressures up to 1200 psi continuous.

While admittedly this type seal will weep at low pressures, the seal is good at high pressures. In most cases, this type seal will have slightly greater leakage at 0 to 5 psi than at 1000 psi.

Surface Finish Important

The wall on the cylinder in one particular installation is held to 10 microinch finish and is produced by lapping. Roughness or waviness is further checked by the simple expedient of running a fingernail over the surface to check the shape of any annular grooves. Poor surface finish will result in short packing life. Proper surface finish results in packing life considered to equal or exceed the life of the equipment.

"L" cup packings, made of Teflon, can also be used. In their use, simple rectangular rubber rings have supplied the necessary preloading as mentioned above. See Figs. 3 and 4. Here again, the packing consists of a single-ring installation with attendant advantages of simple packing recesses and small space requirements. This type packing is subject to the same performance requirements outlined for the U cups described above. Test results reported show torsional drag figures at 700 psi to be 1.5 in.-lb for the Teflon assembly vs. 9 in.-lb for previous assemblies.

Piston rings made of Teflon, Fig. 5, and selected filler materials are used in a number of industrial applications. Some applications have made use of glass-filled Teflon and others graphite filled. These rings have been of the split type with step cut. This type ring is used regularly at 1500 to 3000 psi and has worked well at 4500 psi. This type seal is not a positive seal such as an "O" ring, but used in a closed system will allow leakage of approximately 1 to 2 cc maximum per minute at operating pressures.

Cylinder walls are best held in the range of eight microinch finish or equal to those usually specified for O rings. These rings naturally have no tendency toward spiralling and have no notch sensitivity. The expected life of this type ring is excellent and several "life" tests have been discontinued as results showed a life expectancy of perhaps five times that of the cylinder. Friction is low.

O rings of Teflon have not proved to be satisfactory for dynamic applications due to their inherent lack of resilience which causes permanent set and by-passing of fluids. A recent development has resulted in a "slotted" O ring which adds to the resilience through mechanical means. The rings are undirectional in action as the pressure medium aids in sealing.

This type ring has been used to a limited extent on rod packing where leakage need not be controlled 100 per cent. They are best used in internal seal applications.

Backup rings of Teflon have enjoyed wide-spread acceptance in the hydraulic field. Their use has been largely standardized in military hydraulic applications. The main purpose is prevention of extrusion of primary seal rings, usually O rings of elastomeric base. See Fig. 6. Tendency toward reduction in spiral failures has also been noted due to low coefficient of friction of Teflon

(Continued on page 158)

ALL ENGINEERS LUNCHEON

Sixth Annual Gathering Sponsored by AIPE

CONTINUING their participation in one of the highlights of the annual Plant Maintenance and Engineering Conference and Show, the American Institute of Plant Engineers is again sponsoring the All Engineers Luncheon, on the second day of the Conference. This marks the sixth time that the luncheon has been held.

Scheduled for the Cleveland Room of the Cleveland Hotel at 1:00 pm on Tuesday, January 27, the luncheon promises to provide its usual "break" from the serious business of the Conference and Show.

In addition, it will give visiting engineers an opportunity to "rehash" events of the past year with the plant engineers they met last January at the Conference in Chicago.

Featured speaker at the luncheon will be Dr. G. Herbert True, widely-known author, lecturer and former University of Notre Dame professor. Speaking on the subject of Creativity, Dr. True points out that cost-cutting, money-saving ideas for industry are the result of creative thinking . . . on the part of every employee in an industrial plant.

Dr. G. Herbert True, speaker at the sixth annual All Engineers Luncheon.

His message to plant engineers, to help them improve the frequency and value of suggestions from their subordinates, is sure to prove worthwhile in their everyday relations with plant personnel.

Dr. True brings a wealth of experience to the speakers' platform. A graduate of the University of Oklahoma, he studied at Northwestern University to obtain his Master's degree, and received his Doctorate at the University of Iowa. As a creative behavior consultant, he has numbered among his clients Trans World Airlines, Chemstrand Corporation, American Management Association and the American Institute of Baking. He is currently serving as Vice President, Institute of Visual Research.

Also present at the luncheon will be the newly-chosen national officers of the AIPE. The annual convention of the organization is held on the weekend prior to the Plant Maintenance and Engineering Conference and Show, and the 1959 officers of AIPE will be introduced to the members and guests attending the luncheon.

Included in the luncheon program will be the presentation of the American Institute of Plant Engineers Fellow award. This award is made to honor an individual or individuals for contributions to the profession of plant engineering.

Tickets are currently available . . . just send the coupon appearing on this page (with your check or money order) to AIPE's Assistant Secretary, Kay Buchanan. Chapter members of the Institute should get tickets from their chapter officers.

If you're going to Cleveland, don't miss this annual event. You'll enjoy yourself.

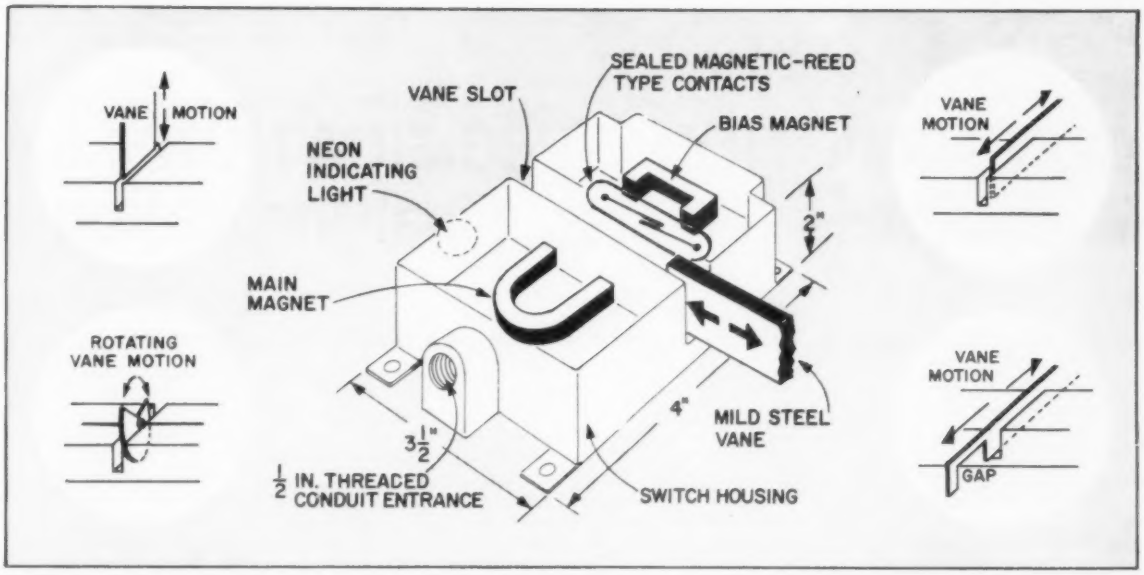
Mrs. Kay Buchanan
Assistant Secretary
American Institute of Plant Engineers
P. O. Box 185
Barrington, Illinois

Kindly send me _____ tickets for the All Engineers Luncheon of the American Institute of Plant Engineers to be held at the Cleveland Hotel, Cleveland, Ohio, at 1:00 p.m. on Tuesday, January 27, 1959. Price: $6.00 per person.

☐ Check ☐ Money Order is enclosed for the reservations indicated above. (Make check or money order payable to the American Institute of Plant Engineers.)

Name _____ Company Address _____

Company _____ City — State _____



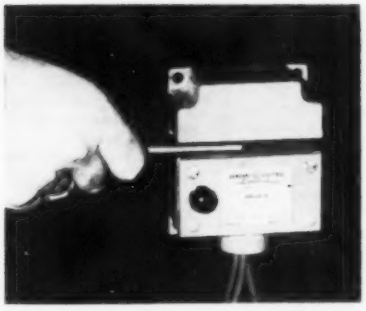
Magnetic field balance is disturbed when vane enters slot, bias magnet closes contacts. Methods of operation are shown.

STEEL VANE OPERATES NEW SWITCH

Features Fast Response And Long Life

ARMLESS, leverless and shaftless, a new proximity-type limit switch is energized by passing a separate metal vane through a recessed slot in the switch housing. The mild steel vane, which is attached to the mechanism to be controlled, disturbs a magnetic field balance causing two small contacts to operate when the vane passes through the slot.

Two permanent magnets are arranged with their fields in opposition to each other. When the vane is not in the slot, the opposing magnets are adjusted so that there will be a negligible magnetic force on the contacts permitting them to remain open. When the vane enters the slot, the magnetic flux from the main magnet is short-circuited by the mild steel vane. This permits the bias magnet to close the contacts. When normally closed operation is desired, the bias magnet is not used.



When vane is moved into slot, switch contacts close lighting neon indicator.

Switch contacts are reed-type construction having a snap-action movement and a maximum rating of 0.2 amps at 115 volts. They are sealed in an inert gas for long life and are located between the two permanent Alnico magnets.

When the operating vane is properly adjusted, the repetitive accuracy is plus or minus 0.0025 in. or less. The operating differential is 0.1 in. and the response time is one millisecond. The vane should normally be made of 1/16 to 3/16-inch thick mild steel, one inch or more wide.

Operating precision is increased by location of the vane path close to but not touching the main magnet side of the slot. A self contained pilot light indicates proper operation of the switch.

Expected operating life is over 250,000,000 operations when used with static control components requiring only 10-ma input current. Test results indicate that with conventional low coil current relays having a holding current of 10 va, the vane operated switch will have an expected life of 30,000,000 operations. Somewhat lower life can be expected when the new switch is used with size 00 machine tool relays which require approximately 100-va coil inrush current.

Developed by engineers of the General Electric Co., General Purpose Control Department, Bloomington, Ill., the switch features long life, sturdy construction and quick, precise operation. **End**

Additional Information

If you would like more information about this Vane Operated Switch, write to Editor, Plant Engineering, 308 E. James St., Barrington, Ill., or indicate "Vane Switch" on the post card in this issue.

CONSTRUCTION SPECIFICATIONS
V. Progress Reports, Final Inspection

By R. E. WALLIN, Chief Engineer, Construction, Plant Engineering Dept., Joseph T. Ryerson & Son, Inc.

PRECEDING ARTICLES have covered the sequence of activities for our construction project to the point at which the construction contract has been awarded.

After the prime contract has been awarded, we always write a short letter to the unsuccessful bidders to express our company's appreciation for their bidding the job and to thank them for submitting a proposal. Included in this letter is a paragraph advising the name of the successful bidder, along with the statement that such contractor was the low bidder.

In the following, when the word "contractor" is used it will mean the successful bidder, who is the prime contractor. The word "superintendent" will mean the contractor or his representative and the word "architect" will mean the architect or his associate. "Plant engineer" will mean the owner's plant engineer or his representative.

During the week or ten days after award of contract the contractor will be busily engaged in organizing the job. This will include moving equipment and shanties onto the job site and setting up the shanties for field office and storeroom use. The contractor or his engineer will be engaged in running center lines and setting up batter boards, and the contractor's superintendent will be on the job full time to co-operate with the engineer and sub-contractors and any others in getting activities under way.

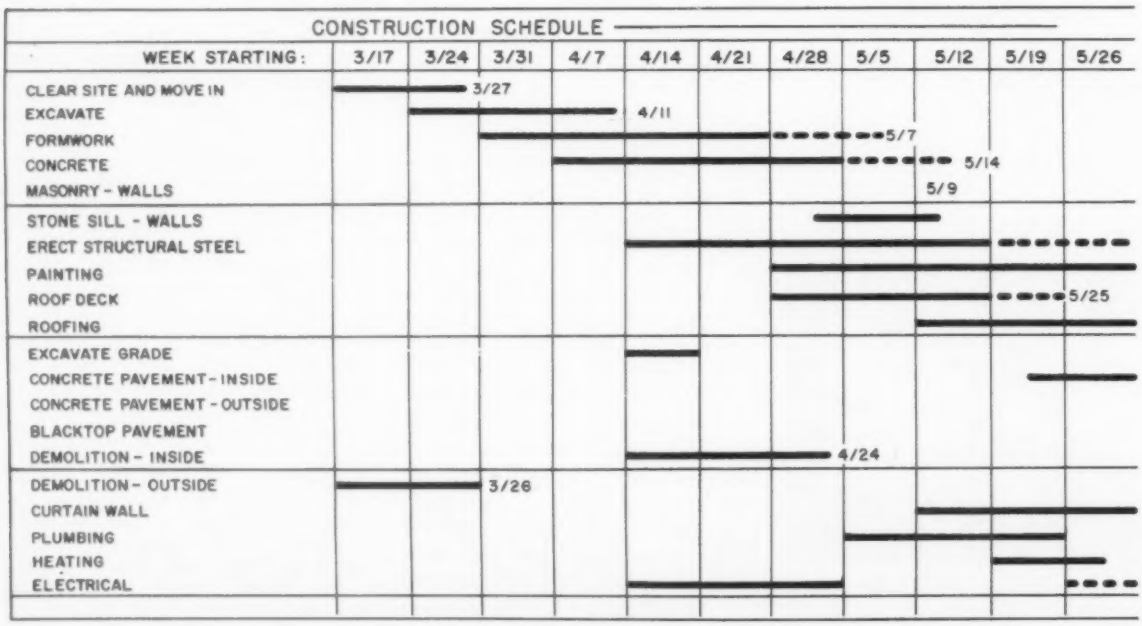
During this time the plant engineer, acting for the owner, should constantly be with the contractor's superintendent, as well as with the architect's representative if such a representative is going to be assigned to the job.

As soon as the organizing of the job site has been achieved, the superintendent, the architect, and the plant engineer should study the plans and the specifications to become as thoroughly familiar with the details of the job as possible. During these study sessions, all questions should be pointed towards clarifying any questionable points which could lead to disputes.

After such a study has completely covered the job and there seem to be no further questions, a "construction schedule" should be compiled by the plant engineer. On this schedule should be indicated, vertically, in the column at the left side of the page the various trades involved in the construction; across the tops of each of the columns to the right the date of each week's Monday from the start of work until the schedule completion of the job; and horizontal bars running from starting to completion points, Fig. 12.

Data for the horizontal bars running from the left to the right and indicating the starting date and the completion date of the work by each trade should be furnished by the superintendent and by the subcontractors and suppliers as soon as subcontracts have been let. This construction schedule should be completed as soon as possible

Fig. 12. The plant engineer should set up a construction schedule similar to the one shown here. This schedule will be



and will be a guide for dispatching the starting and completion dates for all of the various items of work required to complete the job.

During the time that the job is being organized at the site, the main office of the contractor will be busy taking bids and letting the subcontracts and in placing orders with suppliers. If the specifications so state, then these sources should be approved by the plant engineer before they are let.

As each subcontract is awarded, the subcontractor should be invited to join with the superintendent, the architect, and the plant engineer to review plans and specifications, as well as all phases of the work for which he will be responsible. During the course of this review, the subcontractor will advise how much time his activity will require, and when he can get started. This information should then be entered on the construction schedule or compared with the anticipated entry on the construction schedule and adjusted accordingly, if necessary.

After the contractor and all the subcontractors and suppliers have furnished the foregoing information, the construction schedule should be complete and accurate and should reflect a reasonable timetable of performance for the guidance of all concerned. Daily reference to it by all job supervision will permit dispatching the work with minimum lost time.

The plant engineer should have prepared a "daily job report" form to be filled in each day for his own and his company's information. This report will indicate the date, the weather conditions, and list the names of the various contractors engaged on the job by trades, and show the number of men and hours worked by them, Fig. 13.

At the bottom of this report, he may very briefly outline the work being done by each contractor's trade and note the major items of supplies and equipment delivered to the job, as well as any incidents or pertinent information for record purposes. Such a daily report can be circulated to the owner, or executives of the owner, to keep them posted on job progress.

Daily reports can be supplemented with pictures taken at times when progress of certain activities can best be illustrated by photographs. These photographs can be circulated with the report and then filed in a permanent file to give details of construction for future reference. If properly dated and signed by the taker, they may provide important defense material in the event of an accident on the premises of the owner during construction.

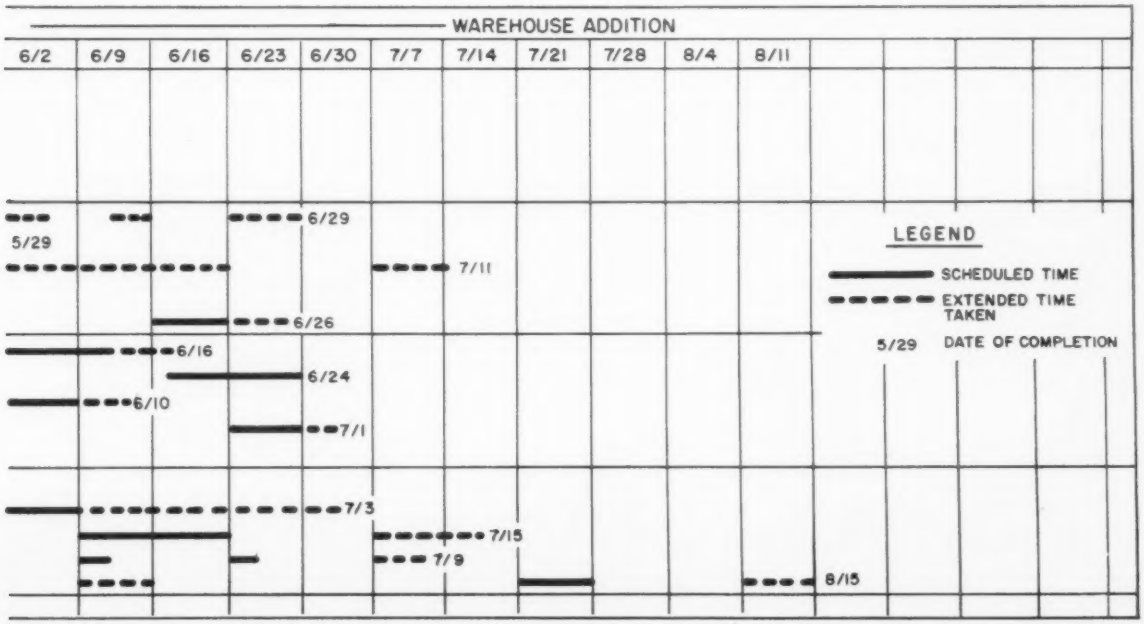
As soon as construction work is started, the plant engineer should inspect materials and equipment as they are received and the work as it is being done. The logical and economical time to correct faulty workmanship on work such as concrete, brick and stone masonry, and plastering, is when such work is in progress especially when it is first started. If progress inspection is diligently carried on by the plant engineer and immediate corrective steps are insisted upon when something wrong is found, then the job becomes raised to a high plane of performance by all concerned.

There are many interruptions during the course of a day which prohibits one from remembering all the various items brought forth during inspection trips and from immediately doing certain things which should be done. To act as a continuing reminder, we have found it a good idea to maintain a "punch list" which is simply a running list of things to do. This can be loose papers on a clip board, a loose-leaf or bound pocket-size book. To this list can be added all items requiring attention as they occur or as they are noted. Items can be scratched from this list as inspection and follow-up indicate that they have been taken care of. We have found that maintenance of such a list and periodical reference to it is a wonderful help in prodding the memory.

During the course of construction, various contractors will send in shop drawings which illustrate parts they wish to furnish or fabricate in their own shops or have fabricated in other shops. They will also send in catalog illustrations which give characteristics of materials and equipment which they are to furnish. Such data should be reviewed and checked by the plant engineer to ascertain that such items conform to those called for in the plans and specifications. Many times specifications will require one make of equipment and will indicate "or equal." Contractors may offer substitutions for the named brand. If this is done, the plant engineer must ascertain that the offered substitute is entirely equal and as satisfactory as the item specified.

Illustrations should be approved only as to general design, capacity, layout and conformance to plans and specifications. They should not be approved as to dimensions, clearances, or fit with other parts, for which the contractor is responsible. A rubber stamp will be helpful if there are many units to approve, otherwise, this data can be written

a useful guide for dispatching the starting and completion dates for all items of work required to complete the job.



as required. If approval is not final, a note should be made on the unit asking that corrections be made and that papers be resubmitted for final approval.

So far, our discussion has been on the basis that all work will be completed by a general contractor for a lump sum price. If the work is to be done on a time and material basis, then the plant engineer, or his timekeeper, shall secure and approve time sheets for all labor working on the job on the contractor's own payroll each day, get a copy of delivery receipts of all material and equipment suppliers covering all deliveries, and a copy of all contracts with subcontractors as soon as such contracts are let.

This time and material data should be complete, and after each day's work should be stapled into a unit and forwarded to an auditor on the owner's staff and filed away so that it can later be used to check and approve the contractor's invoices when they are received. The invoices should be broken down to permit checking against the data in the hands of the auditor.

The plant engineer should avoid telling any contractor's men what to do. One of the principal reasons for this is to avoid changing owner-independent contractor relationship to that of employer-employee relationship and exposing yourself and the owner needlessly to liability in the event of accidents. To clarify this point, consult with your legal department or with outside legal counsel.

A lost day here and there over a period of time just means so many more days added to the due date of material or equipment and a sudden realization that through the negligence of someone in following or because someone did not properly schedule or dispatch delivery a serious delay has been caused in some part of the work.

During the course of construction, dimensions might be changed, equipment substitutions may be made, and data on the drawings or in the specifications may be found to be incorrect. The plant engineer should insist on being advised of all such changes and should make corrections on a master set of drawings maintained especially for this purpose so that when the job is finished this master set of drawings will reflect the job "as built." Upon completion of the job, the architect should then change the tracings of the drawings and the master set of the specifications so that any future reproductions of such papers will give an exact picture of the finished work.

Shortly after all contracts have been let, the general contractor should submit to the owner a letter in which he outlines, either by trade or by the name of subcontractor or supplier, the various items of work which would become part of the completed job and the amount of moneys allocated to each of such items, the total of all such moneys being equal to the total cost of the job. This breakdown is essential for the owner's accounting purposes.

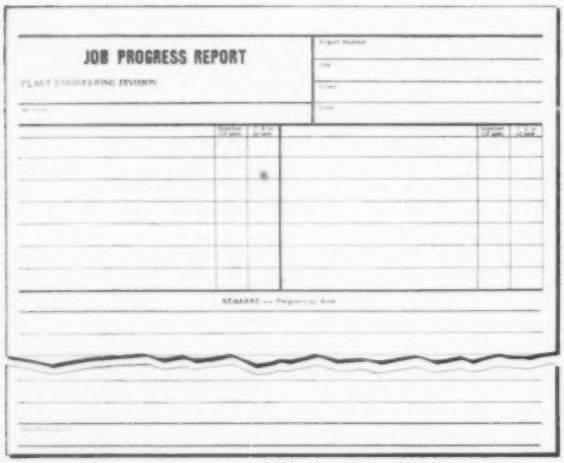

JOB PROGRESS REPORT

Fig. 13. The plant engineer should also prepare a daily job report, indicating date, weather, and names of contractors.

Get These for Your Files—
There's No Charge—
But Request Must Be Made
On Your Company Letterhead

A 16-page copy of section A, "General Conditions," applicable to all contracts, large or small, is available without cost to you. This section, the result of years of experience, gives the exact wording of each paragraph to help convey the intent of your planned work and to properly protect your company.

Also, full size reproductions of the bulletins shown in Figs, 1, 2, 3 and 4, covering changes in specifications or plans, contract change order forms, useful index, and a page from a typical trade specification will be sent to you upon request. **Request must be made on your company letterhead addressed to The Editor, Plant Engineering, 308 E. James St., Barrington, Ill.; all other requests will not be honored.**

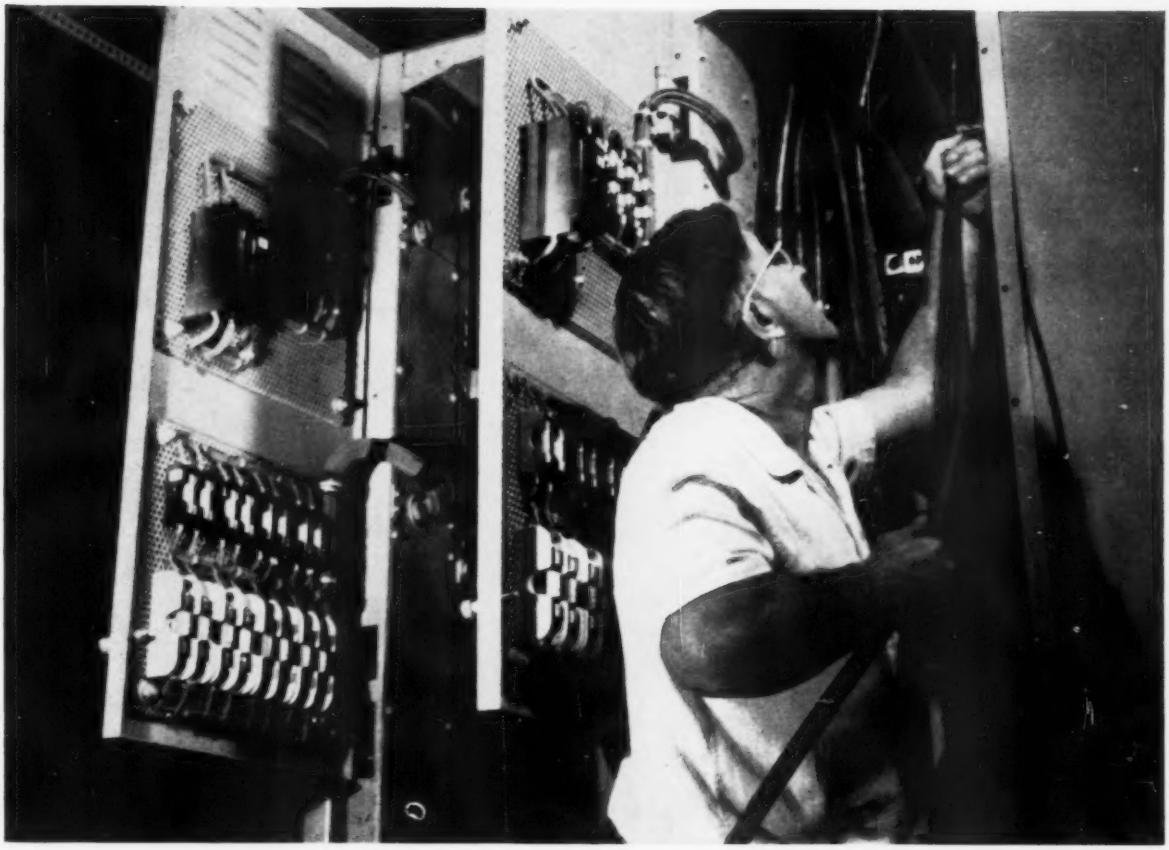
At regular intervals, normally monthly, the contractor will submit a progress invoice. Shown on each invoice should be a copy of the above mentioned breakdown, and opposite each item should be shown the percentage of completion of such item as of the billing date. Each allocated amount multiplied by the percentage shown for the same will be the money spent to billing date. The total of such percentaged amounts will be the total money due. The total due, less the retainage, if there is one, is the amount to be paid on the respective invoice. The plant engineer should review the percentages claimed and approve and then pass the invoice on to the owner's auditor for payment. If the job is time and material and not lump sum, then the auditor will check against time sheets, delivery receipts, and subcontracts prior to approval for payment.

There are certain obligations in connection with completing a building that often become the responsibility of the plant engineer, even though they are furniture and fixture items and are not an integral part of the actual building construction. This includes providing proper telephone service, purchasing and installing an intercommunication system, providing a programming clock system, purchasing and installing partitioning and shelving for office supply rooms and tool-supply-maintenance rooms, selecting and installing window blinds, purchasing and laying carpeting in private offices, purchasing lockers, benches, and similar fixtures, and equipping a recreation-dining room facility.

There will come a time when all items of work will be designated 100 per cent complete, and the only moneys due the contractor will be the retained percentage. The job is now ready for final inspection.

Progress inspection by an experienced hand is routine, and we are sorry that space does not afford detailed discussion of them in this last article of this series. We can, however, suggest the routine for the final inspection. It can be a very informal one where the plant engineer, the architect, and designated people of the owner take a trip through the construction, and, on conclusion of this trip, the plant engineer is authorized to pay all contractors in full. Contrarily, it can be made more formal by the plant engineer, in behalf of the owner, by sending invitations to key people who were concerned with construction to join the owner in making the final inspection and later partaking in a cocktail hour and dinner at a local club. Most contractors at such an affair will tell you that they have given parties, but that this is the first party where the owner did so for the contractors on completion of a job.

After completion of the final inspection, the contractors should complete any odds or ends discovered, or additional work requested as a result of the inspection, and then send in the bills for final payment including the retained percentage due thereon. **End**



When you must pack a lot into a small space . . . specify Rome's "CT-2" control cable

These cables are intended for installation in underground conduits or ducts, directly in the earth, or open air.

Conductors: Conductors conform to ASTM Specification B-8.

Insulation: Insulation conforms to IPCEA Appendix P.

Color Coding: All conductors shall be color-coded in accordance with IPCEA recommendations.

Assembly: For three conductors or more, the insulated color-coded conductor shall be twisted with jute fillers when necessary to make round, and a suitable tape shall be applied over the assembled core. Two-conductor cable shall be flat.

Over-all Sheath: An over-all sheath of Rome Synthinol* shall be applied over the tape core.

Here's a way to speed up the job of making complex control-panel connections in tight quarters. Install cable that meets your *budget*, *quality*, and *space* requirements.

You'll find that just such a cable is Rome's "CT-2" control cable. Its smaller diameter will fit into your most compact panel arrangements. It's lightweight, too, and easy to pull through conduit. And it represents good quality at moderate cost.

Your choice of cable sizes

This low-surface-friction cable has an all-thermoplastic construction featuring $^{3}/_{64}$" Rolene insulation (polyethylene) plus an over-all sheath of Rome Synthinol (polyvinyl chloride).* It's available as a standard construction with one to 12 conductors in No. 9 and No. 12 AWG sizes.

Insulation: Sure and dependable terminations are possible because Rolene strips cleanly. This smooth, positive-stripping polyethylene lets you consistently make an efficient installation.

Sheath: Rome Synthinol is a thermoplastic (PVC) compound that offers high resistance to oils, most acids, alkalis, grease, gasoline, weathering and flame.

Use Rome's "CT-2" control cable for your next job where space is at a premium and fast, efficient installation is mandatory.

Find out how Rome's control cable can fit your installation picture. Contact your nearest Rome Cable representative—or write to Department 852, Rome Cable Corporation, Rome, N. Y.

*Alternate sheaths of Rolene (polyethylene) or Roseal (flame-resistant polyethylene) are also available.

ROME CABLE

CORPORATION

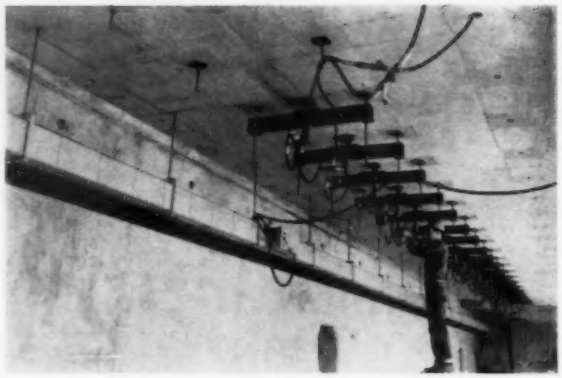
For more facts circle 558 on Reply Card

New Concrete Testing Laboratory Uses Floor As "Test Bench"

THE "WORLD'S LARGEST TESTING MACHINE," actually a three-story structural laboratory, has been completed at the Research and Development Laboratories of the Portland Cement Association, near Chicago. The lab is constructed entirely of precast concrete building units which were tilted or lifted into place by rigs and cranes. The building floor, designed like an exceptionally strong bridge, is pierced by 690 holes. With relatively simple apparatus, used in conjunction with this special floor, technicians at the new laboratory are able to conduct many tests that cannot be carried out anywhere else.

The top surface of the testing floor is 24 in. thick, and is joined to an 18-in.-thick basement floor by a series of 8½-ft-high walls. In cross section, it resembles a large hollow box-girder bridge.

The floor is pierced by holes spaced every three feet along its 120-ft lengths and 56-ft width. To make most tests, steel rods are attached to the test beam or girder, and extended downward through the holes to connect with hydraulic jacks located in the basement. These jacks pull down on the rods, exerting loads on the test beam above.

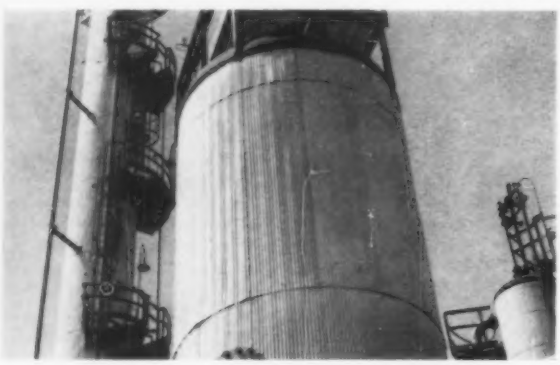


The floor can withstand test pressures, produced by the hydraulic jacks, of more than 10 million pounds, and a floor slab or roof shell test piece can be subjected to local loads as high as 30,000 lb per sq ft. A 50-ft-long beam can be test-loaded with 2 million pounds.

Aluminum Jacketing, Corrugated and Cross-Crimped, Protects Insulation

AN EXTENSIVE APPLICATION of protective, corrugated aluminum over insulation on large towers and vessels has recently been completed at the Phillips Petroleum Co. refinery in Sweeny, Texas.

Childers Manufacturing Co., Houston, furnished 97,953 sq ft of deep corrugated aluminum jacketing for this installation. All of the material was formed with 1¼-in. corrugations from 0.019-in.-thick aluminum, and was supplied with factory-attached moisture barrier to guard against corrosion on the interior of the aluminum "shell."



Calcium silicate and cellular glass type insulation was applied to the fractionator towers and caustic washer vessels. The aluminum jacketing was secured over this insulation with stainless steel sheet metal screws. Where necessary, the screws were supplemented with circumferential bands of ⅜-in. aluminum strapping.

Phillips engineers chose aluminum jacketing for its long life and its appearance. Features included in the aluminum used are the factory-attached moisture barrier, which saves labor costs for installation, and cross-crimping of the aluminum, which consists of rolled-in 3/16-in. cross-corrugations going across the corrugation normal to the sheet length.

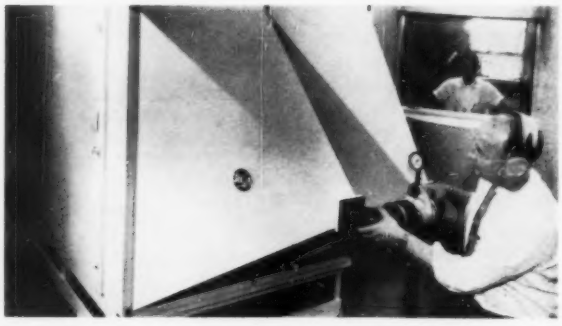
This feature increases the strength of the deep-corrugated jacketing approximately 28 per cent, according to Childers, and this extra strength can mean up to ⅓ savings in the cost of the jacketing.

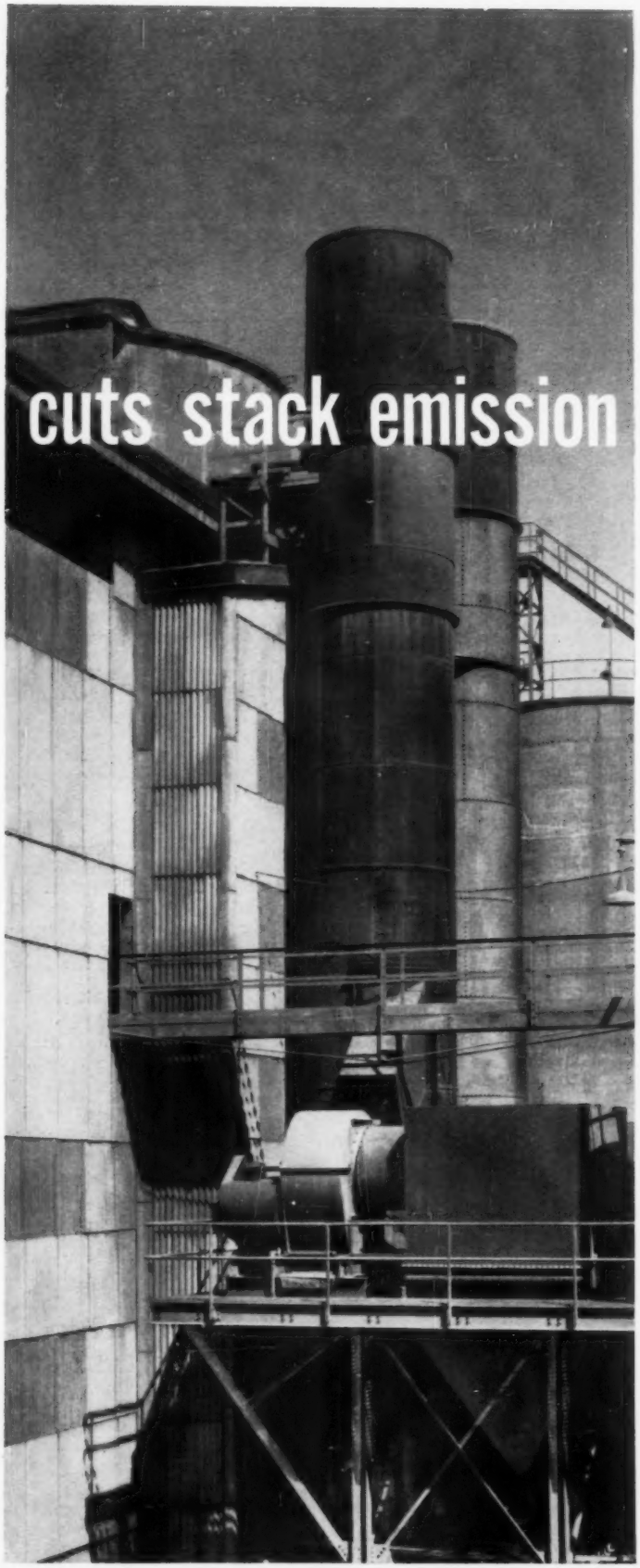
Engineers Develop World's Biggest Noise To Test Electronic Equipment

TO TEST SENSITIVE ELECTRONIC GEAR used in jet planes, missiles and rockets, engineers of the Radio Corporation of America have developed a new device believed capable of producing the world's loudest controlled noise.

Known as a Compressed Air Loudspeaker, the device can generate noise of 160 decibels—more than 10,000 times as intense as the noise of the heaviest street traffic, and 20,000 times as great as a typical television set.

The loudspeaker, now in development stage at RCA's Industrial Electronic Products unit in Camden, N. J., is a plywood box measuring five feet by five feet by six feet, eight inches, with dual horns projecting from the box. Attached to the tip of each horn is a metal pipe leading to the loudspeaker's "plumbing system."





Hagan Dust Collector proves 96.5% efficient

on clinker cooler at Dragon Cement Company

One of two 173 tube units recently installed at the Dragon Cement Company, Northampton, Pa., this Hagan Dust Collector passed ASME Power Test Code No. 21 with flying colors. The test was conducted to determine efficiency and to show compliance with requirements of Lehigh Valley Air Pollution Control. Conducted to the satisfaction of R. Emmet Doherty, Director of LVAPC, results indicated that the Hagan Dust Collector, handling 38,000 cfm at 490F, was operating at the highly satisfactory efficiency of 96.5%.

Local codes demand a stack emission of not more than 0.25 grains per cubic foot. The Hagan Dust Collector is holding stack emission to *0.0437 grains per cubic foot, less than one-fifth of the permitted total.*

The two collectors recover more than 9500 pounds of cement dust every 24 hours. This is returned to process, so that not only is a local dust nuisance ended, but valuable product is salvaged.

Efficiency and product recovery are two of the many reasons why Hagan Collectors provide substantial savings to industry. But the most economical feature of the Hagan Collector is its ability to resist abrasion. Selective Particle Acceleration, an exclusive Hagan development, reduces wear on tubes to a minimum. Hagan Collectors, working on flue dust and other extremely abrasive materials, show negligible wear after more than three years service.

Put this economical Collector to work in your plant. Ask a Hagan engineer to explain how the Hagan Collector can save you money in your plant, or write for Bulletin MSP-124A.

HAGAN CHEMICALS & CONTROLS, INC.

HAGAN BUILDING, PITTSBURGH 30, PENNSYLVANIA
DIVISIONS: CALGON COMPANY, HALL LABORATORIES
IN CANADA: HAGAN CORPORATION (CANADA) LIMITED, TORONTO

For more facts circle 559 on Reply Card

NEW PLANT CONSTRUCTION —advance information on location, costs

Fairfield, Ala. — United States Steel Corp.'s Tennessee Coal & Iron Division plans to install a new 54-in. pickling line at company's tin mill located here. Company is presently installing a continuous annealing mill at the facility which will be completed late in 1960. Work on the pickling line will get under way soon for completion about the same time.

Phoenix, Ariz. — Mech-Tronics Corp., 1625 N. 25th St., Melrose Park, Ill., will erect a new plant in this area for the manufacture of company products. New plant will have a floor area of 30,000 sq ft. Future expansion up to 100,000 sq ft is being planned at a total cost of about $1 million. Work on the initial facility will begin at once for completion late in 1959, at a cost of $250,000.

Fresno, Calif.—International Paper Co., Container Division, 220 E. 42d St., New York, N. Y., plans to construct a unit for the production of corrugated boxes and containers. Construction of the new plant will begin at once and will cost just under $1 million when completed in 1960.

Stockton, Calif. — Mexico Refractories Co., Mexico, Mo., manufacturers of fire brick, clay, mortar, etc., plans to construct a new refractories plant here. Work on the one-story masonry and steel structure will begin soon for completion by the fall of 1959. Cost reported to be approximately $2 million.

Denver Colo. — Hamilton Watch Co., Lancaster, Pa., plans to double the capacity of its instrument manufacturing plant located here. Work on the new facilities will begin at once and will include new research headquarters, and a test laboratory.

Danbury, Conn. — Viking Wire Co., Inc., 13 River St., plans to construct a wire manufacturing plant on Shelter Rock Rd., this city. The one-story masonry and steel building will have a floor area of 40,000 sq ft. Construction contract of over $500,000 was awarded to Leo McManus, Shelter Rock Rd., Danbury, Conn. Work will begin at once and company plans to have new plant in operation by early 1960.

Norwalk, Conn.—Perkin-Elmer Corp., Danbury Rd., plans a major addition to main plant here. New addition of 55,000 sq ft will increase manufacturing area of the plant by one-third. Plans include a 48,000-sq ft two-story wing scheduled for completion by mid-1959, and a 7000-sq ft one-story wing to be completed later that year.

Fort Pierce, Fla. — Tree Sweet Fruit Co., this city, plans major alterations and additions to company's cold storage buildings and feed mill. Work will get under way at once for completion by late 1959. R. C. Stevens Construction Co., 3030 Rutland building, Orlando, Fla., has been awarded the construction contract, reported to be about $800,000.

Hialeah, Fla.—Lawnlite Co., 2400 N. W. 75th St., Miami, plans to construct a manufacturing plant and office building on large site here, near the Seaboard Air Line Railway. Proposed aluminum furniture plant will be a one-story building of concrete block and steel construction with a manufacturing area of approximately 35,000 sq ft. Shinn & Hutcheson, 401 Coral Way, are consulting engineers for the project, reported to cost more than $700,000.

Chicago, Ill.—Wyler & Co., 1050 W. Fullerton Ave., this city, plans to construct a one-story brick dehydrated food plant and office building on the northwest corner of Campbell Ave. and Addison St. Construction of the new facility, with a floor area of 54,000 sq ft, will begin at once and is scheduled for completion in the fall of 1959. Cost when completed reported to be $500,000.

Plainfield, Ill.—Continental Can Company's Hazel-Atlas division will double the production capacity of its glass container plant located here. The division will also build a glass container research and development center on the premises.

Shelbyville, Ill.—Oliver Corp., 400 West Madison St., Chicago, Ill., plans a major addition to local plant here. Plans call for the addition of 80,000 sq ft of manufacturing and office space at an estimated cost of $750,000. Plant will produce hay balers, mowers, and rakes along with other agricultural implements. Work will get under way at once and will be completed in late 1959.

Springfield, Ill.—Pillsbury Mills, Inc., Pillsbury building, Minneapolis, Minn., plans major expansion of company's production facilities at plant located here. Plans include enlargement of the plant's turbo milling operation, installation of large storage bins, and special equipment for bulk handling of flour along with new packaging machinery and equipment. Expansion will cost approximately $1 million.

Jackson, Miss.—First Mississippi Corp., located here, plans to construct a $1 million multi-wall paper bag plant. The site of the proposed plant has been conditionally selected as Yazoo City, Miss. Plant will be designed to convert raw paper into multi-wall bags.

Springfield, Mo.—Dayton Rubber Co., 10 Rubber St., Dayton, O., plans to construct a plant here. New plant will be used primarily for the manufacture of mechanical rubber goods and will be of brick and steel frame construction. The one-story structure will cost about $1.6 million and will have approximately 200,000 sq ft of manufacturing area.

Marlboro, N. J.—Fritsche Brothers, Inc., 85 Third Ave., Clifton, N. J., subsidiary of Dodge & Olcott Inc., New York, N. Y., plans a facility for the manufacture of perfumes and food essences, on large site here, recently selected for the purpose. Work will get under way, soon after preliminary engineering work is completed, for scheduled operation by early 1960. Cost when completed reported to be about $1 million.

Shelby, N. C.—A new jointly owned subsidiary of Celanese Corp. of America and Imperial Chemical Industries, Ltd., of London, has changed its name and has announced plans for construction of a new plant for the production of polyester synthetic textile fiber. Subsidiary, formerly called Lindum Fibers Corp., has been renamed Fiber Industries, Inc. New company has acquired a building site near here of about 215 acres and plans to begin construction of the first unit at once. Plant is planned for an eventual capacity of 40 million pounds a year.

Columbus, O.—Midwestern Volkswagen Corp., 1855 Northwest Blvd., plans to construct a one-story plant here, in the Kinnear Road industrial area. Plant will be of steel and concrete construction and will be used as a central parts depot, office administration building and as a retail service outlet. Plant and equipment will represent an investment of $1 million.

Solon, O.—Bird Electronic Corp., 1800 E. 38th St., Cleveland, O., manufacturers of coaxial watt-meters, terminations, switches, and filters, plans to construct a plant here for the manufacture of company products. New facility will be of concrete and steel construction with a floor area of approximately 40,000 sq ft. Cost of new plant will be approximately $500,000. Construction will begin soon for completion by the spring of 1960.

Houston, Texas—Armour & Co., 31st St., Chicago, Ill., plans to construct a meat processing and distribution plant to service this area. Construction of the plant will start in the spring of 1959 and will replace company's present downtown plant. New plant will have an abattoir, refrigerators, assembling and shipping facilities, a sausage kitchen and other facilities for curing and smoking meat and slicing bacon. Plant when completed in 1960 will represent an investment of $2 million.

For more facts circle 560 on Reply Card ⟶

BERGEN GETS 8 LJUNGSTROMS®
...AND SOME REMARKABLE CUSTOMER SERVICE

Public Service's new Bergen Generating Station will be served by 8 large, horizontal Ljungstroms. Almost as important . . . the Ljungstroms will be serviced *throughout* their life by Air Preheater.

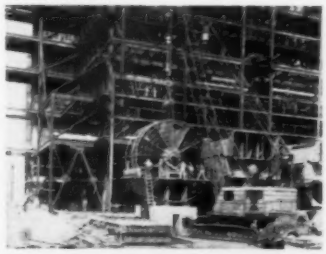
What's special about this customer service? For one thing, it's the considerable knowledge and talents of Air Preheater's engineers. They have been involved in nearly every conceivable type of boiler/preheater problem. They've seen how these problems can be handled. And they can put this experience to work for operators of Ljungstrom air preheaters.

Your Air Preheater engineer also makes regular calls to check the operation of every Ljungstrom – for as long as it's in service. (This now includes installations dating back to 1923.)

So, when you select a Ljungstrom, you're never entirely on your own. You *continue* to be the responsibility of a competent Ljungstrom engineer and benefit from his experience and knowledge. Maybe that's why 9 out of 10 preheaters sold are Ljungstroms.

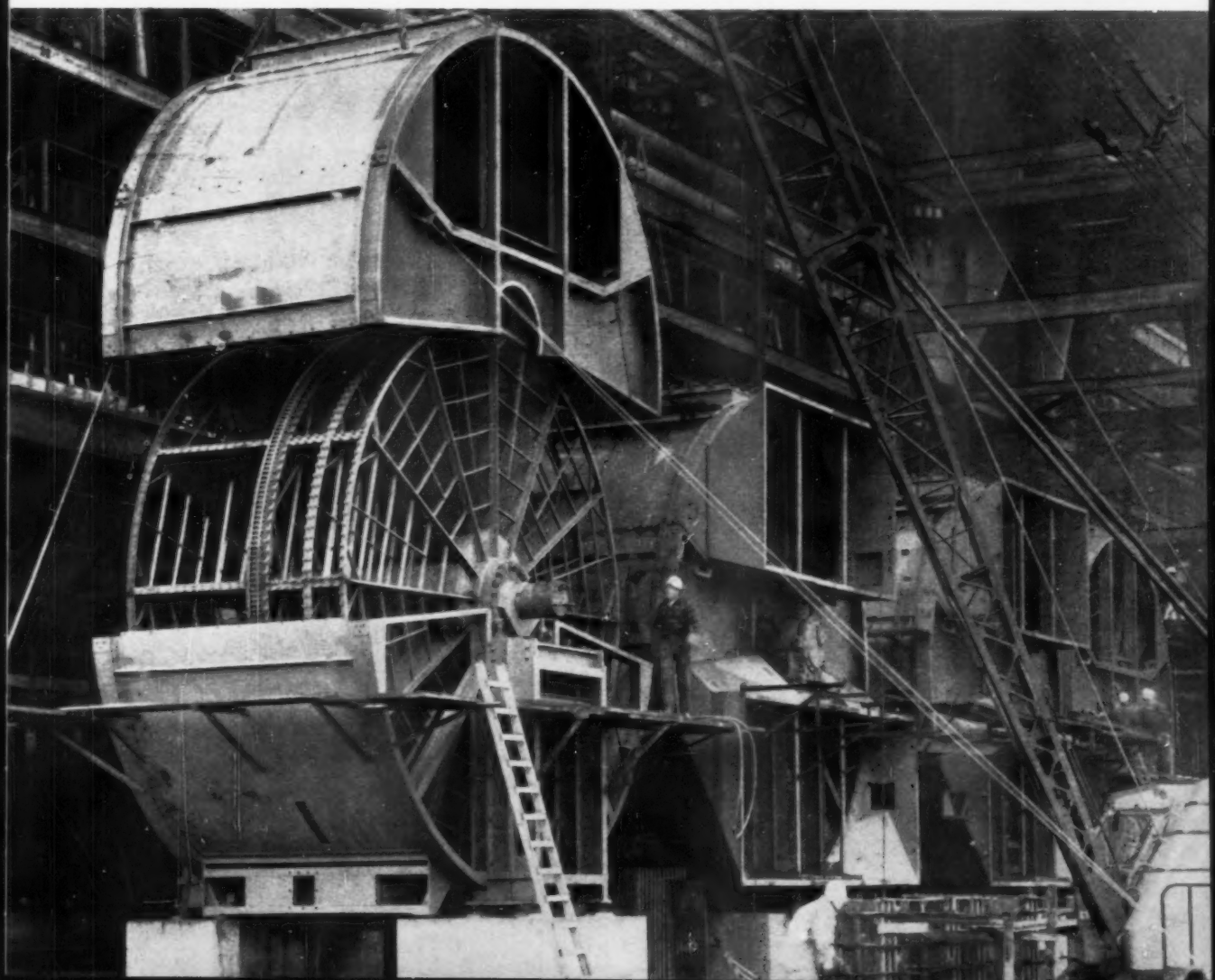
Thirty-five tons of Ljungstrom rotor being lowered into place at the new Bergen Generating Station at Ridgefield, N. J. (When the heating elements are installed the rotor will weigh 150 tons.) This is one of eight preheaters being installed by Public Service Electric and Gas Co. to serve two boilers – each evaporating 1,900,000 lbs of steam/hr. The first boiler is to be fired early next year. Anticipated preheater outlet temperature is about 275 F.

Public Service is one of the first Northern utilities to use large-size horizontal preheaters. They have nine such horizontals in operation at their Linden Generating Station and have ordered eight more for their new Mercer Generating Station.



THE AIR PREHEATER CORPORATION

60 East 42nd Street, New York 17, N. Y.



NEW PRODUCTS AND PROCESSES summarized for your convenience

Edited by M. E. Heniken

1—CONTROL RELAY offers mounting advantages

Rated at 10 amp, 600 v, the Type D line of mechanically held relays, mounts in the same panel space as standard electrically held re'ays. This eliminates need for mounting mechanically held relays separately, says company, and both mechanically and electrically held relays can be mounted on the control panel in the proper sequence as they appear on the elementary diagram. Type D Relays are offered as factory-assembled units, or as electrically held relays and mechanically held attachments for customer assembly. They come in a variety of units up to 10 contacts. Bulletin SM-278 gives details. Square D Co.

2—DRAFTING TOOL speeds mechanical drawing

This drafting tool combines the functions of a drafting machine, and is designed to eliminate the use of T-square and other drafting aids. You can make complete drawings with it, company says. On its 14-in. hypotenuse, (10 in. Tenite-II triangle), all baselines, perpendiculars, bi-sections, parallels, common angles and isometric projections are projected with a single stroke. It comes with instructions, costs under $5.00. Pacemaker Drafting Supply Co.

Use the Reader Service Cards provided on pages 161-162 to ask for more information on these products. Circle item numbers of products in which you are interested.

4—DISPOSAL UNIT treats the plating room wastes

Announced as an inexpensive disposal unit, the Model 5769 Cyanizer is designed for treatment of cyanide wastes and built as a packaged unit. It consists of sump tank, baffle tank, pumps and controls. In operation, cyanide wastes are collected in the sump and then pumped into the baffle tank where they are neutralized by a concentrated sodium hypochlorite solution. The baffle tank retains the wastes for treatment for 1 hr, while the sodium hypochlorite is automatically metered into the solution in proportionate amounts to obtain complete neutralization. The entire process is automatic and continuous in operation, it is noted, and the neutralized discharge from the Cyanizer can be dumped into municipal sewer systems. The unit requires no operator, is claimed easy to install and to clean, and comes in sizes to accommodate large or small flow rates. George L. Nankervis Co.

5—ROTATING RACK keeps your catalogs handy

For plant engineers who refer to a large number of catalogs and bound information, the Catalog Storage Rack can be used by one person or, when centered, by two or more. Based on company's Rotabin principle, this rack is a series of four independently revolving trays in which catalogs may be filed. Each rotating

section consists of a one-piece hub and one-piece bottom disk, and five permanent dividers welded into a rigid assembly. Each permanent compartment measures 21 in. wide at the face, 15 in. deep, 7 in. high. Overall height of the rack is 65½ in. It has gray or green enameled finish. The Frick-Gallagher Mfg. Co.

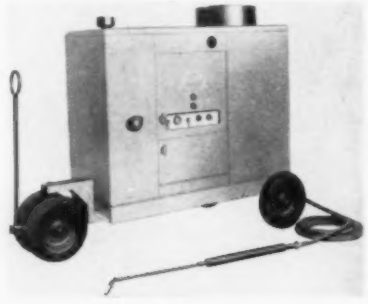
3—HAND SPRAY GUN does electrostatic painting

Advantages of this manufacturer's No. 2 Electro-Spray Process, formerly available only in automatic units, are now offered in a hand-operated spray gun, which does not require conveyorized production. The gun consists of an atomizing bell incorporated into a lightweight unit for manual operation. A voltage pack is connected with a flexible cable to the gun, creating an electrostatic field between atomizing bell and article to be coated. (The article must be electrically grounded.) Coating material is supplied to the atomizer by pump unit or pressure tank. Rotation of atomizing bell feeds the liquid to its outer edge. Atomization occurs, it is explained, producing a spray of electrically charged particles, and electrostatic forces attract the spray to the article.

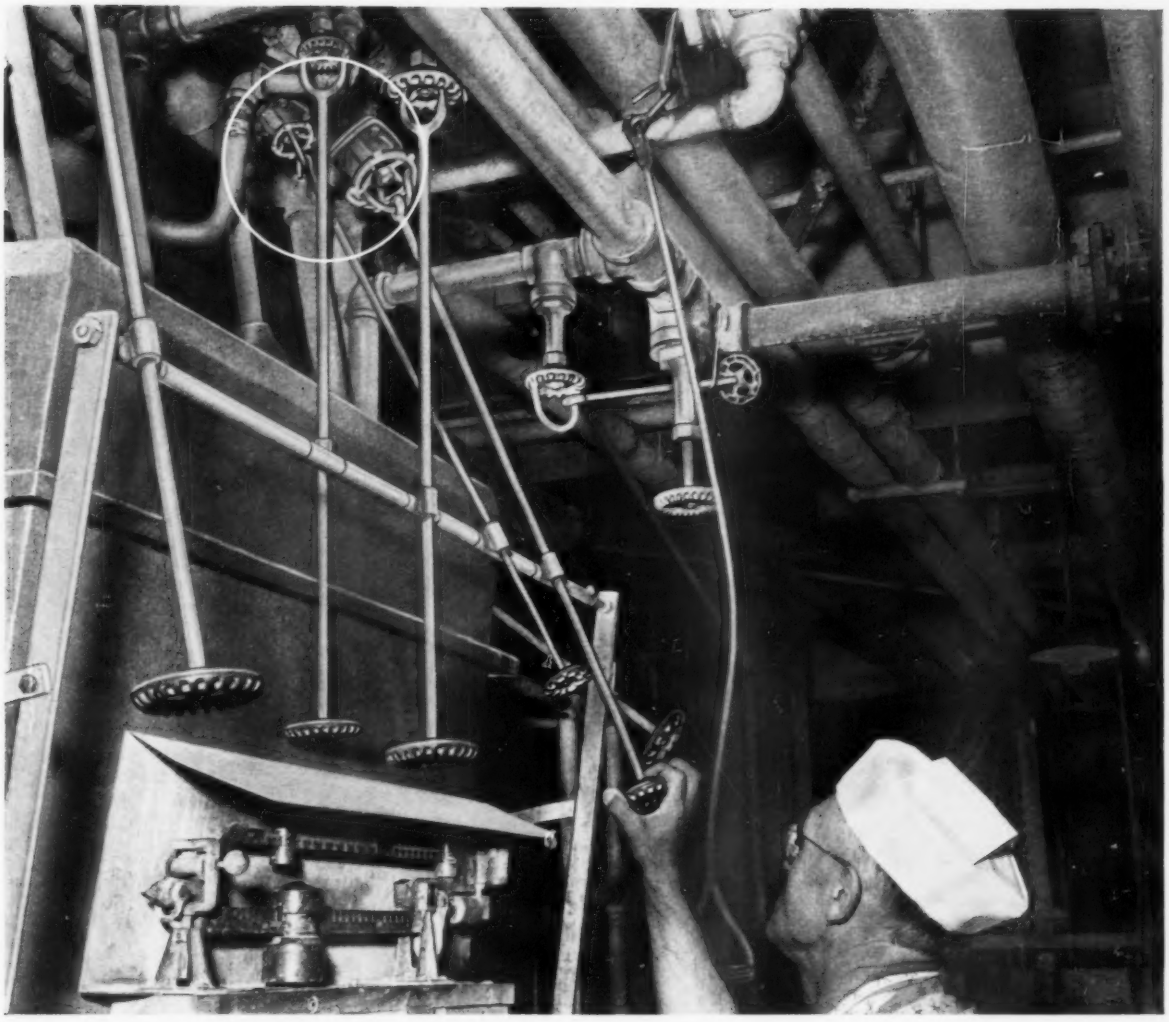
In many cases, the gun has a painting rate equivalent to a conventional air spray gun, it is stated; and it is considerably faster on articles fabricated from perforated and expanded metals, tubing, rod and wire. This is due to the "wrap-around" nature of electrostatic spray which paints all sides of such shapes from one side only. Conventional spray booth equipment is not required, according to manufacturer. Ransburg Electro-Coating Corp.

6—STEAM-HYDRAULIC UNIT with 11 cleaning actions

Heavy machinery and equipment are cleaned four to six times faster with the 3500 Series Hypressure Jenny, a steam-hydraulic cleaner, according to manufacturer. Choice of 11 different cleaning actions is afforded by a single lever. This gives the



operator the right pressure and gallonage for the job at hand, without power waste, it is stated, and the cleaner's 360-gph pump delivers only the amount required. Being a steam-hydraulic cleaner means that



Mill solves diaphragm rupture problem on clay coating—with Crane Valves

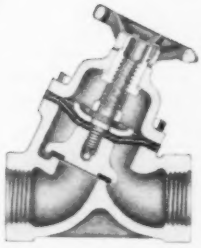
This midwest paper mill was plagued by continuing failure of diaphragm valves handling abrasive clay coating mixtures at 112° F. In closing these ordinary valves, operators had to force the diaphragms against a weir to get tight closure on the clay particles. As a result, the diaphragms would deteriorate and rupture quickly.

In an effort to cut maintenance and replacement costs, the mill changed to Crane No. 1610 diaphragm valves with neoprene diaphragm and disc insert.

In these modern Y-pattern Crane valves, the sole function of the diaphragm is to seal off the bonnet. Valve closure is made by the separate disc; its soft neoprene insert absorbing any solid particles or foreign matter present. No extra force is needed for tight shutoff.

Although operated on an average of 35 times daily, these Crane diaphragm valves, *five years after installation*, still operate perfectly. Not one cent has been spent for repairs or diaphragm replacements. Valve closure, with extension stems, is always easy and tight.

Where can Crane improved diaphragm valves do a better job for you? For helpful recommendations see your Crane Representative, or write to the address below.



Note separate disc in Crane diaphragm valves. Diaphragm serves only as bonnet seal. Wide choice of body and trim materials, body linings. Sizes ½ in. to 14 in. Screwed or flanged.

CRANE VALVES & FITTINGS

PIPE • PLUMBING • HEATING • AIR CONDITIONING

Since 1855—Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers Serving All Areas

For more facts circle 561 on Reply Card

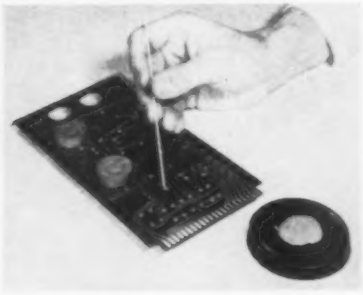
NEW PRODUCTS

(Begins on page 120)

the proper combination of heat, pressure and cleaning compound is available, company points out. Outlet pressures and temperatures are variable by the operator up to 300 lb and up to 325 F. The cleaner comes in trailer-mounted, shop portable, or stationary models, with oil or gas for fuel. Hypressure Jenny Div., Homestead Valve Mfg. Co.

7—CONDUCTIVE CEMENT has good bond strength

Hysol 6250 is a conductive cement based on epoxy resins, 100 per cent solids. Volume resistivity is measured at 0.01 ohm-cm at 25 C. Offering excellent bond strengths to



most materials, according to company, it is particularly recommended for repair of printed circuits and for bonding of electrical components where soldering cannot be tolerated. The compound will cure in 24 hr at room temperature, or in 2 hr at 140 F. It is supplied in convenient kit. Houghton Laboratories, Inc.

8—CEILING TILE is low priced, repaintable

Cavity Tile is a low cost, incombustible ceiling tile which features repaintability with no loss of sound absorption efficiency, says manufacturer. Its name is based on the cavity resonance principle utilized, in which $\frac{3}{8}$-in. gypsum board is the chief element, with a porous membrane laminated on the back. The space above the ceiling suspension system on which the tile is applied serves to provide a spring-like action of air that dissipates sound waves as they are forced back and forth through the membrane. This tile is reported especially effective in areas requiring uniform sound absorption across the frequency scale.

Cavity Tile can be repainted repeatedly, it is stated, and is easily maintained. Manufacturer recommends a flat wall paint or low-sheen enamel. It can be cleaned by dry vacuuming, with putty or paste wall paper cleaner or a synthetic sponge. It comes in a 2-by-2 ft size and is installed on company's "T & T" suspension system. The Celotex Corp.

9—SANDER-PLANE is versatile and fast-cutting

Perma-Grit Brand Sander-Plane will cut in half the time usually required to remove material from wood, plaster, plastics or other composition materials, it is announced. The abrasive surface of the tool is of tungsten carbide grits copper-bonded to a steel blade. The plastic handles are shaped like those of a regular plane, with two-handed grip, to permit balanced action and full leverage for heavy strokes. According to manufacturer this tool removes material faster because it cuts on both forward and back strokes or even with a circular motion. It can be used for filing, sanding, planing, shaping or beveling. An almost indefinite service life is reported for it because of the permanent bonding of each grit to the surface of the steel. Manufacturer does not recommend this tool for use with metal. Skil Corp.

10—COMPACT MACHINE TOOL puts hurricane force to work

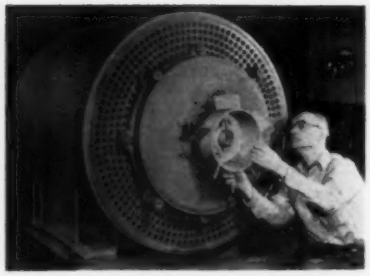
Described as a "captive tornado" the multi-purpose Dynapak is a high-velocity, high-energy-rate machine for forming, extruding, compacting, shearing and blanking of metals and other materials. It is unconventional in size, shape and finish. Its chrome-plated components are enclosed in a neat white and blue enameled housing; its rapid action is controlled

from an operating console. According to manufacturer, the Dynapak is inexpensive, safe and simple to operate; it is reliable and repeatable, and while only a fourth the size and weight of many metalworking machines, is capable of producing parts that cannot be shaped by them.

The Dynapak combines the HYGE actuator and a Mark H dynamic reaction frame into one easily installed machine tool. The actuator is a self-triggering, gas-powered ram capable of delivering the energy potential of 2000 psi of gas to a free piston column assembly. Its output energy range is claimed almost infinitely wide, depending on operating pressures, piston diameter and stroke. Thus, this horizontally positioned piston may be a free impact tool or sustaining thrust device.

Of three standard Dynapaks, Model 600, shown ready for firing, is the smallest. It has a 6-in. bore and 12-in. stroke, is only 2 ft wide and high and 9 ft long. It is claimed capable of producing 40,000 ft-lb of energy at velocities of more than 200 ft per second. Yet it weighs only 3000 lb, and only four bolts fasten it down. No one- or two-story substructure is required for a Dynapak, it is pointed out, for the energy developed is absorbed in the working of the material and by the dynamic reaction frame. The two larger sizes, Models 1200 and 1800, develop 160,000 and 360,000 ft-lb of energy.

A major advantage announced is that because of the high pressure

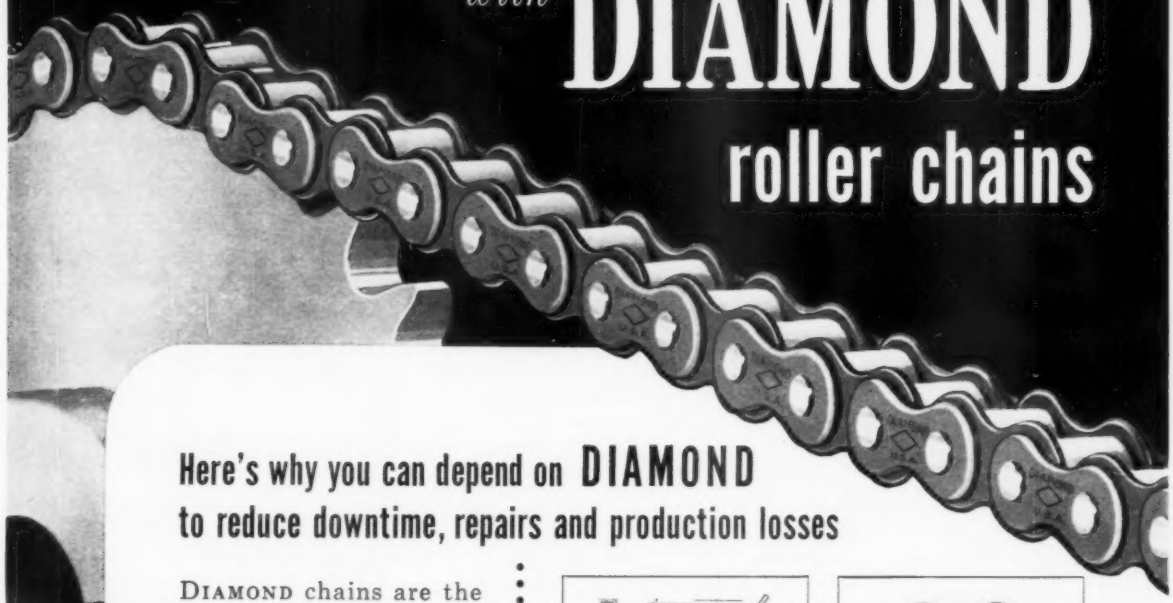


11—POLYPHASE MOTORS are tube type units

These tube-type, totally enclosed, fan-cooled squirrel-cage motors are offered in polyphase ratings through 500 hp. Cooling is provided by a series of tubes through which outside air is forced by an external blower. An internal blower at each end of rotor circulates warm air inside the motor through ducts in rotor and stator and around cooling tubes, to hold the temperature rise within the specified limit. Standard enclosed motors are built with Class A insulation for 55 C rise or with Class B insulation for 75 C rise. Explosion-proof motors are built with Class A insulation only and are reportedly UL approved for operation under classified hazardous conditions. Wagner Electric Corp.

YOU GET LONGER SERVICE LIFE at LOWER OPERATING COST

with DIAMOND roller chains

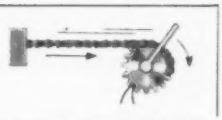


Here's why you can depend on DIAMOND to reduce downtime, repairs and production losses

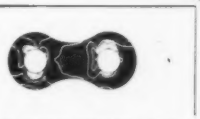
DIAMOND chains are the product of more than 65 years' experience in solving difficult problems of load, shock, fatigue and abrasion. Only DIAMOND gives you so many engineering and manufacturing refinements. DIAMOND gives you roller chain *thoroughly proven* for dependability and long life. DIAMOND *durability* pays off in reduced equipment downtime and repairs, fewer production delays, and fewer chain replacements.

Look for the ◇ on every link!

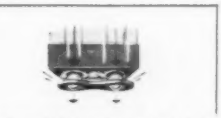
Your DIAMOND Distributor has all types and sizes of standard Roller Chain in stock. Bronze and stainless steel are available for corrosive conditions. Look under "Chains" or "Chains, Roller" in the Telephone Directory *Yellow Pages* . . . or write to factory for Diamond Chain Catalog No. 757, and name of your nearest Distributor.



FIRST TO PRE-LOAD PRODUCTION ROLLER CHAIN—Pre-loading seats pins, bushings and linkplates; takes out initial stretch.



FIRST TO STUDY FATIGUE—First to make design changes in roller chain parts for improved fatigue resistance.



FIRST TO BALL DRIFT—Pitch holes in DIAMOND chain sideplates are ball drifted for greater fatigue resistance—(DIAMOND patent).

FIRST TO EMPLOY SEAM RELIEF BUSHINGS—Seam relief bushings reduce run-in time and provide better lubrication—(DIAMOND original patent).

FIRST TO PROPERLY PLACE BUSHINGS—DIAMOND bushing seams are placed away from load-bearing area for improved resistance to wear and fatigue.

FIRST TO SHOT PEEN—DIAMOND chain parts . . . rollers, bushings, linkplates and pins . . . are shot peened for greater fatigue resistance.

DIAMOND CHAIN COMPANY, INC., *A Subsidiary of American Steel Foundries*

Dept. 614, 402 Kentucky Avenue, Indianapolis 7, Indiana • Offices and Distributors in All Principal Cities

DIAMOND ROLLER CHAINS

For more facts circle 562 on Reply Card

NEW PRODUCTS

(Begins on page 120)

generated, Dynapak produces parts that cannot be made in other ways. For example, says company, it extrudes parts with web thickness of 0.01 in., forges to zero draft angle, and produces smooth, close tolerance surfaces requiring little or no finish machining. Dies may be of ordinary steels. It is noted that in many applications, metalworking can be done without use of lubricants or heated dies. Low cost and simple operation are also stressed. Manufacturer says the Dynapak can work all day on a $3.00 bottle of nitrogen compressed to 2000 psi, and once a tooling engineer has set up the machine for the desired application, an operator manipulates a dial to sequence the firing cycle. Convair, Div., General Dynamics Corp.

12—HYDRAULIC JACKS keep the load level

This portable system of hydraulic jacks is designed to raise equally when operated by one man from a central control panel. As announced, each jack has a rated capacity of

15 tons, with a safety factor of 2; by unification of hydraulic pressure, one jack can raise 15 tons while another jack, operating from the same unit but carrying no weight, will raise at the same level. The system is claimed to lift any type of heavy object safely, in less time and with less labor. The device is reported adaptable to lifting machinery, heavy bridge sections, buildings to be moved. The large 13-jack standard system is 7 by 9 ft, constructed on a deck which fits a one-ton truck body. The complete system includes jacks, unifying mechanism, high pressure pump, control panel, hose and powered hose reel. It may be powered by take-off from truck engine as well as from a self-contained power source. Modern Hydraulics, Inc.

13—CELLULAR INSULATION improved are dry chemical

Presst-O-Cel is a preformed, closed-cell tube and pipe insulation designed to stop condensation, insulate against heat loss, and serve as a vapor barrier. It is suggested for covering tubes and pipes subjected to temperature or humidity conditions that might create "sweating" or condensation—such as refrigeration and air conditioning lines. Of expanded Neoprene, this insulation consists of millions of closed cells that exclude water, moisture and air, it is explained, and the result is an extremely low K factor—0.30 at 120 F. Several advantages are claimed for Presst-O-Cel including water and air tightness; oil, acid, alkali resistance, high insulation value and long service. It is also non-inflammable, company states, and is unattractive to rats, mice and vermin. It comes in 6-ft lengths, in a ½-in. wall thickness for standard pipe from ⅜ to 2½ in. Presstite-Keystone Engineering Products Co.

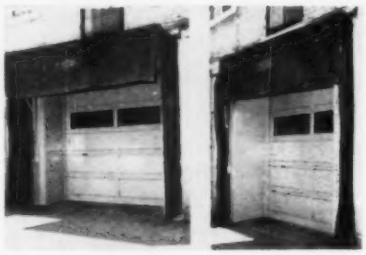
14—ADHESIVES bond almost anything to anything

According to manufacturer, this family of rubber-like adhesives can't resist a molecular urge to bond nearly any surface to itself or to another. The new adhesive material is described as a polymer with built-in adhesive characteristics—inherently sticky in and of itself and requiring no added resin or other tackifier. As explained by company, chemical "hooks" attached to each molecule of the new material compel the adhesive to cling to and join surfaces.

Available as a laminating adhesive, A-916-B, this pressure-sensitive thermoplastic material is reported to bond new synthetic films to all kinds of metals, as well as to paper, wood, glass, plaster and other materials—without heat or surface treatment. Basically colorless and transparent, the material can be furnished in any color. It is prepared in concentrated solution—50 per cent solids with a minimum of volatiles—a little goes a long way. Company says it has good storage stability and retains its cohesive properties indefinitely in storage or in service, in or out of solvent. It can be brushed on, roller- or knife-coated, or modified for spray. Deposited films are claimed permanently pressure-sensitive. B. F. Goodrich Industrial Products Co.

15—FLOOR MATERIAL has skid resistant quality

This powder and liquid binder was developed for resurfacing floors, stairs, ramps, metal cat-walks, and stair treads. Called Stoncap, it is described as slip resistant, long lasting, and resistant to greases, oils, fats, brines, and alkalis. Resilient and lightweight, Stoncap is reported ready for foot traffic as soon as 5 hr after installation, for trucks within 24 hr. Stonhard Co., Inc.



16—DOCK SHELTER is an economically priced unit

Although low in price, the Econo-Dox is announced as offering one-man operation in seconds, spring-tensioned upper frame, adjustable front head curtain, UL approved fabric, and frame assembled at the plant. Standard fabricated sizes include a maximum width to 11 ft and maximum height to 13 ft. Standard projection is 2 ft 9 in. The cover is green 12.29-oz duck. The standard unit sells for around $185.00. Frommelt Industries.

17—SPRAY CLEANER for the special cleaning jobs

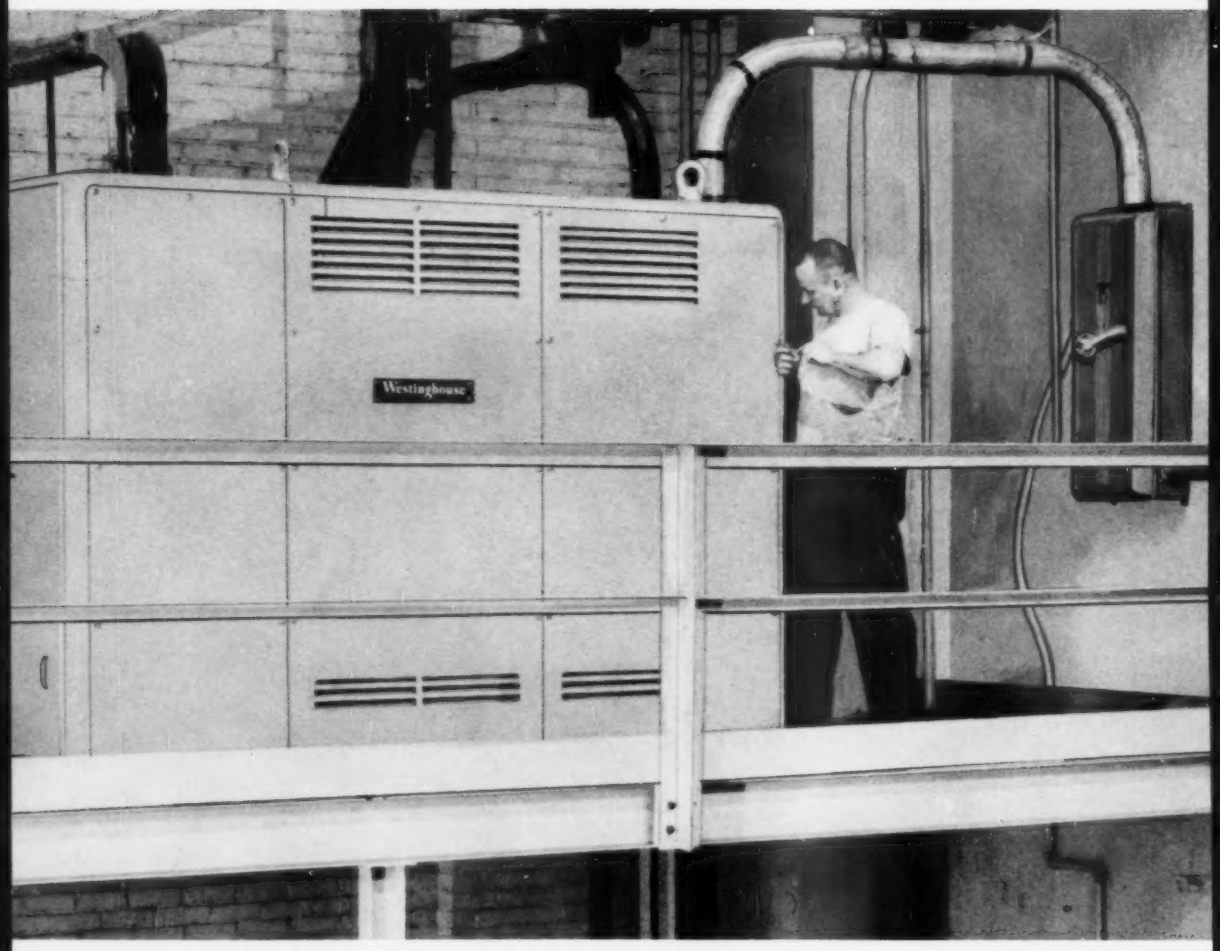
Vythene-E is announced as a purified grade of Vythene, having an exceedingly low percentage of non-volatile material and a boiling range narrower than that of commercial 1, 1, 1-Trichloroethane. Because of the low percentage of residue in the product, Vythene-E is suggested for such uses as cleaning of oxygen bearing equipment, sensitive electronic parts, and many extraction and pharmaceutical purposes. As with its parent product, Vythene, Vythene-E is reportedly about 20 times less toxic than carbon tetrachloride and has no flash point. It is also said to be stabilized to all metals, including aluminum. It can be reclaimed. Tect, Inc.

(More New Products on page 153)

For more facts circle 563 on Reply Card ——→

four types of Power Centers meet every application

Choose From the Westinghouse Full Line...

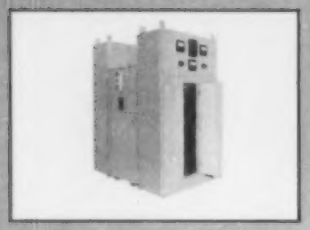


If you have a power distribution problem — whether a change-over to higher voltage or a complete modernization of existing facilities . . . indoors or out . . . a safe or hazardous location . . . clean or dust-laden atmosphere — there's a Westinghouse self-contained Power Center to fit your application.

The economics of future power growth in your plant demands flexibility. Self-contained Westinghouse Power Centers deliver it — let you handle present loads economically, while allowing for expansion . . . Here is a *full line* of Power Centers — liquid-immersed, ventilated dry-type and sealed dry-type — that makes it easy and economical to POWER-UP for greater production.

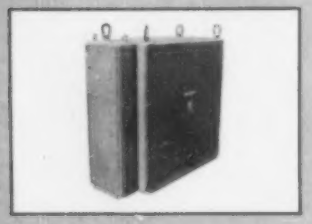
Whether liquid-immersed or dry-type, the transformers in Westinghouse Power Centers are of superior construction — from the inside out.

when you select a Power Center... how important is single responsibility?



Liquid-Filled
112½ through 2000 kva, 15 kv and below

Ventilated Dry-Type
45 through 2000 kva, 15 kv and below



Sealed Dry-Type
300 through 2000 kva, 15 kv and below

Mine
(liquid-filled and dry-type)
45 through 750 kva, 15 kv and below

For Engineering

When you order a Westinghouse self-contained Power Center, every component is coordinated — transformer, switches, breakers, panelboard and related accessories — as true work-together equipment.

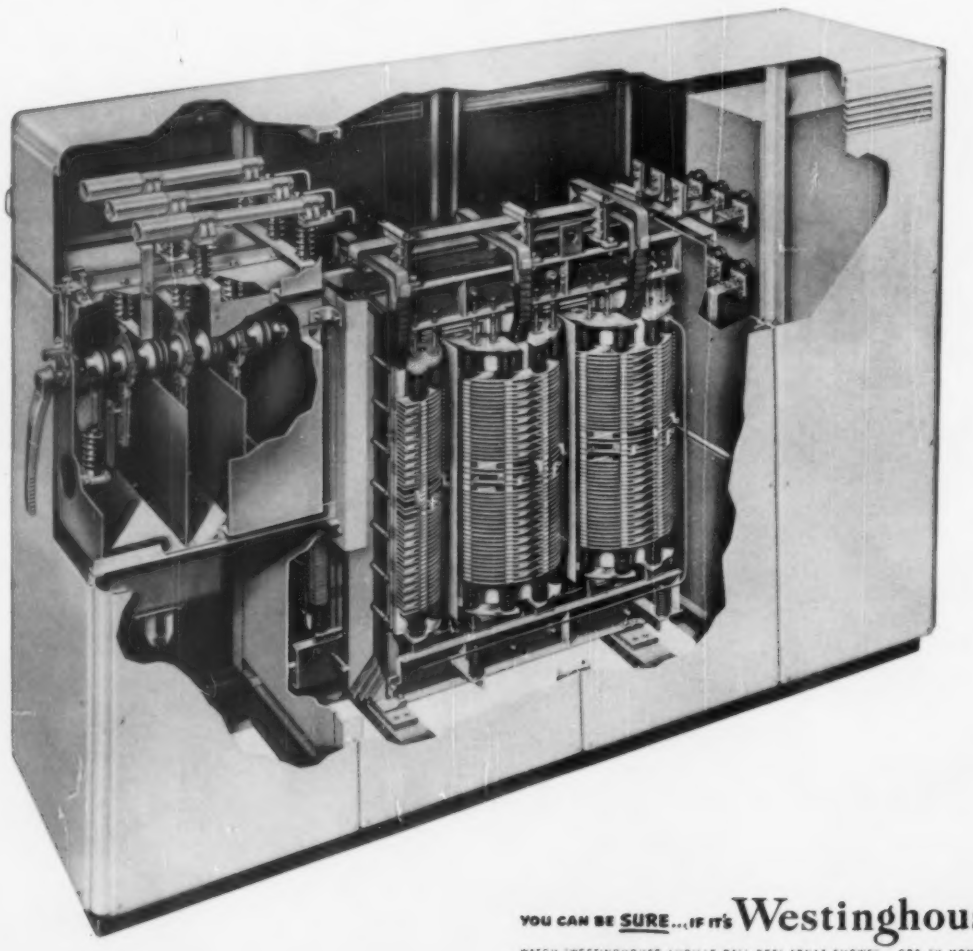
For Manufacturing

Each component is also coordinated through manufacturing and delivery. All components are built, assembled, tested and delivered together — in one compact unit . . . with one responsibility for all.

For Field Service

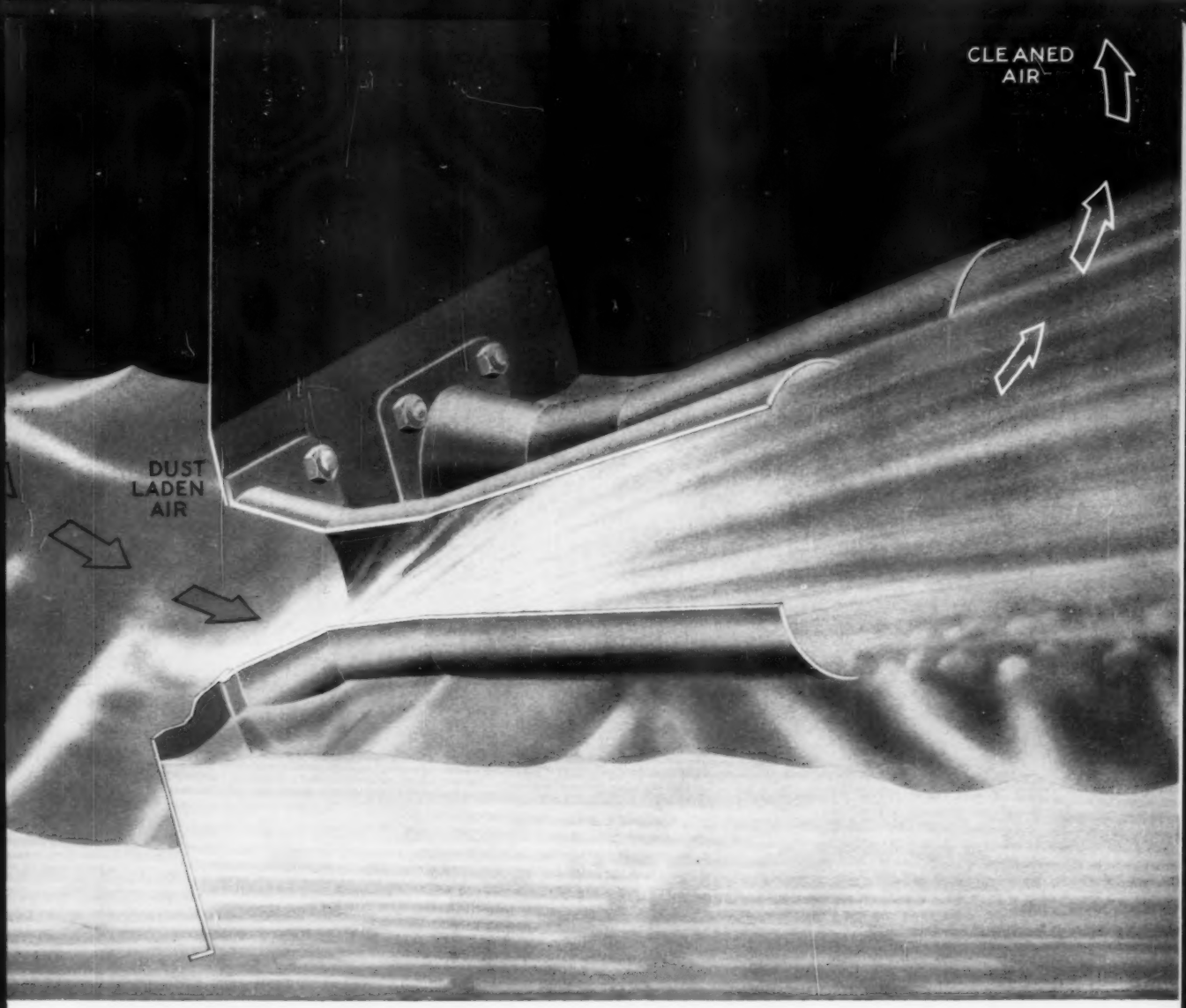
Proper functioning of all components of the Westinghouse self-contained Power Center is the responsibility of a single company with one of the country's most extensive field service organizations. Field service of all Westinghouse Power Center components rests solely with Westinghouse.

Check your electrical system with a Westinghouse Power Chek-Up Kit. If excessive losses, poor regulation and obsoleted equipment are adding to your power distribution costs, chances are that you need to POWER-UP — the *modern* way — with a *modern* self-contained Power Center from the Westinghouse full line. Your contractor, your Westinghouse distributor or local representative will be glad to discuss means for solving your plant distribution problems. J1-70886



YOU CAN BE SURE...IF IT'S **Westinghouse**

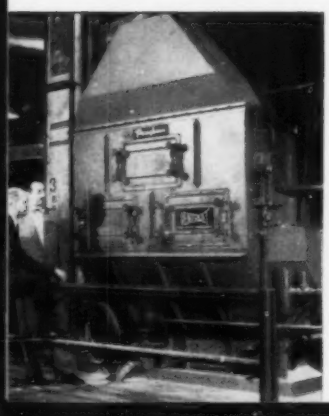
WATCH "WESTINGHOUSE LUCILLE BALL DESI ARNAZ SHOWS" CBS TV MONDAYS



Puts the squeeze on difficult dusts

Pangborn Ventrijet Wet Dust Collector uses exclusive venturi tubes for peak efficiency

Pangborn Ventrijet Wet Dust Collector on the job. This is just one of Pangborn's comprehensive line of wet and dry dust collectors.



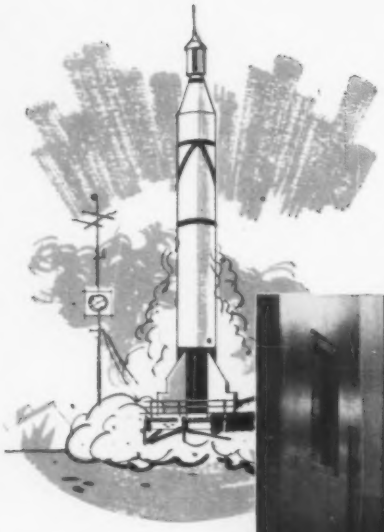
That pinch-necked venturi tube is the secret behind Pangborn Ventrijet performance. As dust-laden air flows through these tubes, the constriction creates a low-pressure area which draws water into the air stream. The resulting turbulence breaks the water into particles which actually *wash* the dust from the air. The simplicity of Ventrijet design saves money in its ease of installation, its low cost of operation and maintenance.

Although the Ventrijet is particularly suited to collecting hot, moist, inflammable, corrosive and obnoxious dusts, the Pangborn engineering it typifies is important to *any* dust-producing plant. It is not enough to put a dust collector within a plant. An efficient dust control system must be *scientifically* planned, designed and constructed to handle effectively a specific dust problem. This thinking is incorporated into every Pangborn proposal.

The Pangborn Engineer in your area will be glad to go to work for you. He is a dust expert *and will discuss your individual problem at no obligation. And, for more information, write for Bulletin 922 to:* Pangborn Corp., *3200 Pangborn Blvd., Hagerstown, Md. Manufacturers of Dust Control and Blast Cleaning Equipment.*

Pangborn CONTROLS **DUST**

For more facts circle 564 on Reply Card



7½ MILES OF SPACE ENCLOSURE

at Patrick Air Force Base...

A typical example of how J-M Transitop panels economically and attractively partition miles of interior space at Patrick Air Force Base.

—with Johns-Manville TRANSITOP® panels

While scientists experiment with shooting missiles into outer space, administrators at Patrick Air Force Base, Cocoa Beach, Florida, are faced with practical problems of enclosing space for earth-bound personnel.

Transitop panels furnished by Johns-Manville—seven-and-one-half miles of them—were used to provide headquarters space needs. These modern panels, used as interior walls, meet the many different requirements for administrative space enclosures.

Transitop, an insulating structural panel, consists of an impregnated core faced on two sides with incombustible Asbestos Flexboard* sheets. Transitop is available in panels 4′ wide by 8′ up to 12′ in length.

Engineered for durability, Transitop is ideal for use as the interior surface for structural walls or as free-standing ceiling height walls. It also provides every requirement for insulated curtain wall construction.

For the complete story on Transitop, write to: Johns-Manville, Box 158, New York 16, New York. In Canada write: 565 Lakeshore Road East, Port Credit, Ontario.

Send for brochure "J-M Asbestos Transitop"

36 pages with illustrated sections on Interior Wall Construction . . . Curtain Wall Construction . . . Roof Deck Construction . . . Steel Framing, Wood Framing, Moulding Systems . . . Design Data . . . Special Applications, etc. It's free for the asking.

JOHNS-MANVILLE

JOHNS MANVILLE JM PRODUCTS

For more facts circle 565 on Reply Card

new... Powermaster®

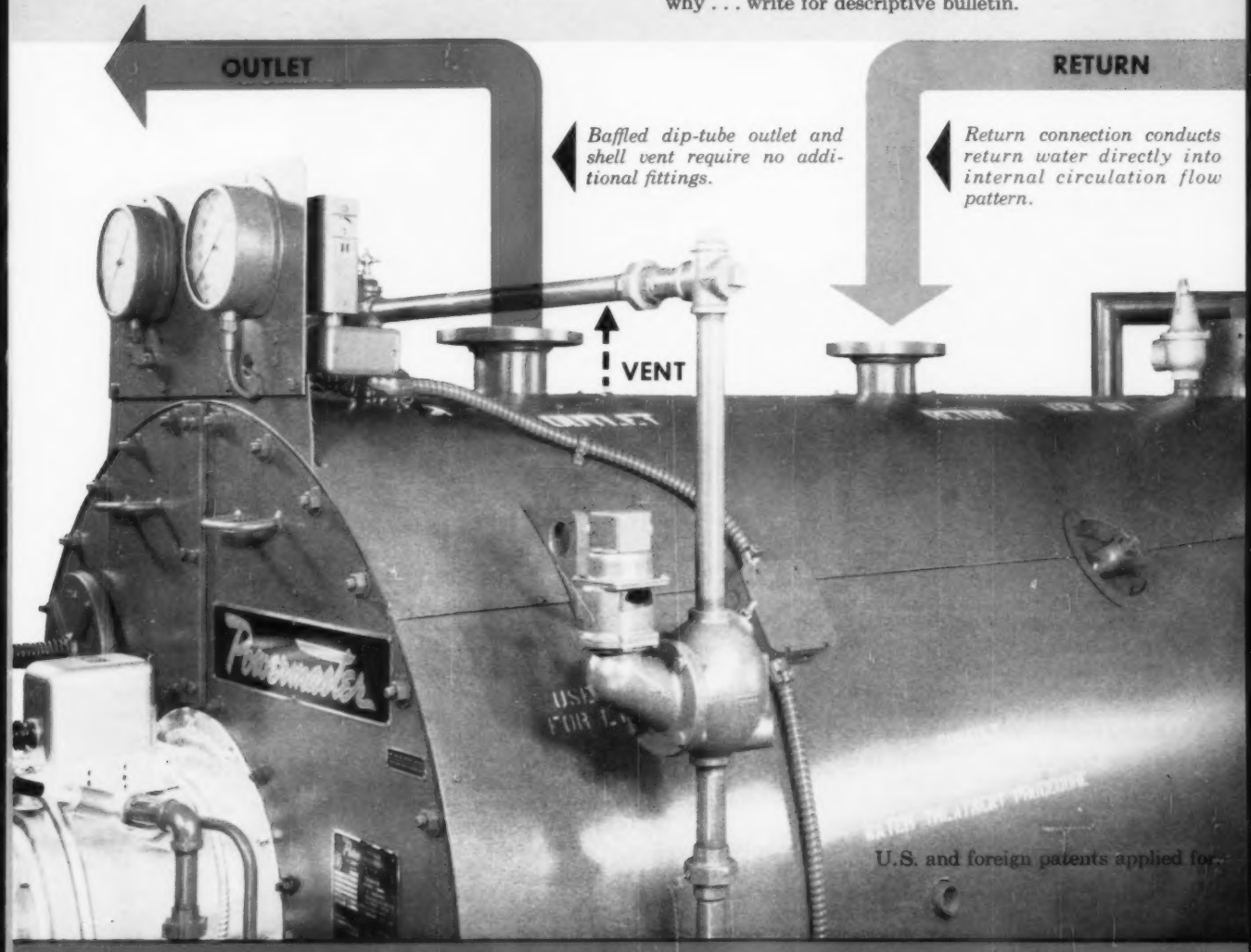
PACKAGED AUTOMATIC BOILER

for forced circulation hot-water heating

The newest O&S *Powermaster* boiler design is engineered specifically for modern forced circulation heating applications. It is the *first* hot water heating boiler developed for such institutional, commercial and industrial applications.

Two years of concentrated research and development in internal boiler water circulation produced this modern automatic unit. It now affords building owners, heating contractors, consulting engineers and architects an efficient and reliable boiler ideally suited to the wide variety of flow rates and temperatures met in present-day hot water heating system designs for schools, apartments, shopping centers and industrial plants.

Only with this new *Powermaster* do you have complete assurance that the burner, controls and boiler itself meet the highest standards of hot water heating system performance. This advanced design can save you fuel dollars, efficiency dollars and maintenance dollars. Call in your O&S representative to find out why . . . write for descriptive bulletin.


OUTLET
RETURN
Baffled dip-tube outlet and shell vent require no additional fittings.
Return connection conducts return water directly into internal circulation flow pattern.
VENT
Powermaster
U.S. and foreign patents applied for.

Builders of Dependable Boilers Since 1885

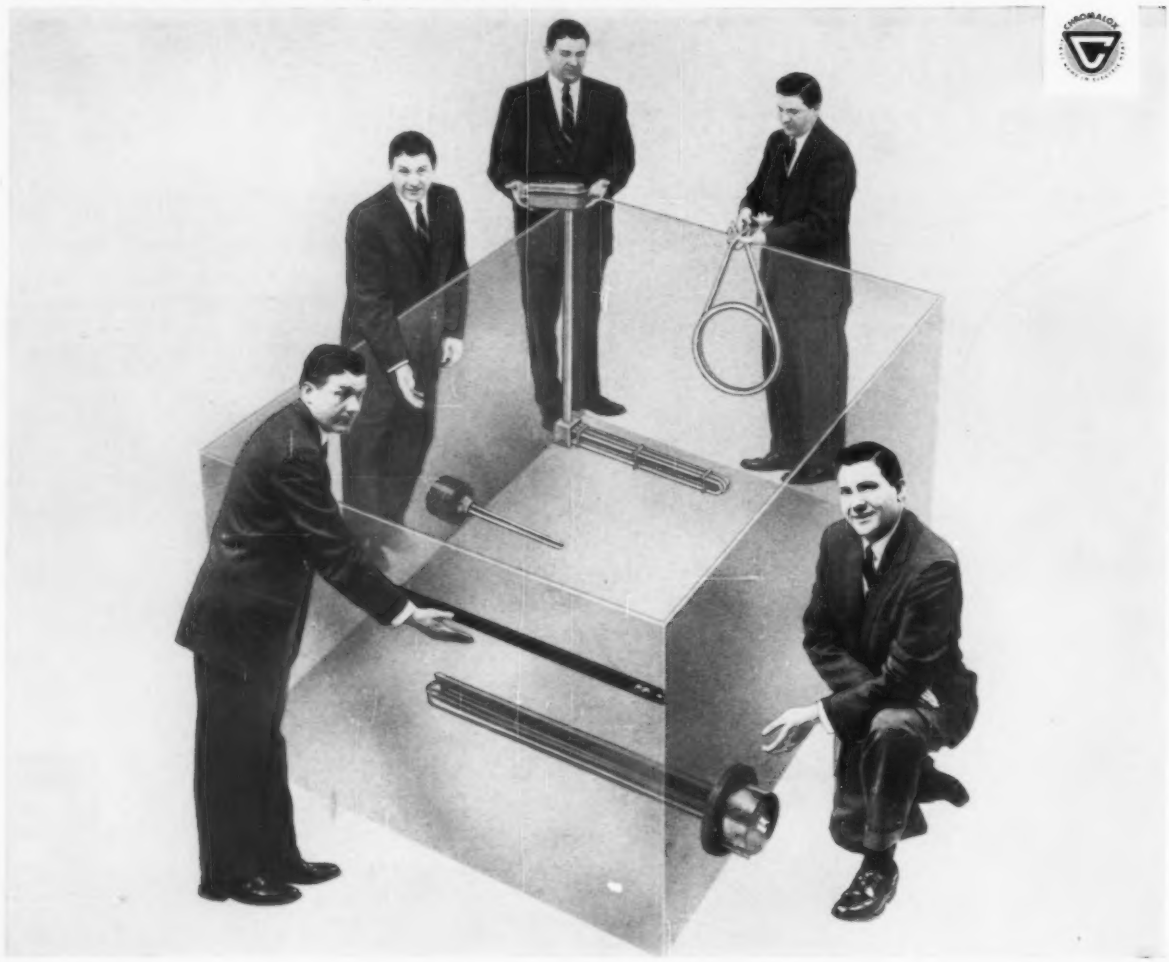
O&S

ORR & SEMBOWER, INC.

POWERMASTER/Models 3, 4 and 5...POWER-PAK and BURNERS

For more facts circle 566 on Reply Card

What's the best way to heat a tank?



Your Chromalox man has the **ANSWER**

Trying to heat a tank with steam or combustible fuels often presents rough problems, costs needless time and money and leads to ineffective results. But 97 times out of 100 there is a quick and effective electric answer—and your "CHROMALOX man with the answers" has it. Here, for example, are five ways of heating a tank—each presenting significant advantages, and using stock industrial heaters in most instances.

- In the foreground, CHROMALOX Strip Heaters are clamped to the tank wall, heating by conduction, without contacting the tank contents. Tank interiors have full work space—cleaning is simplified.
- Moving clockwise: CHROMALOX Screw-Plug-Immersion Heaters, with standard pipe threads, go to work quickly in heating water and corrosive solutions. Heavy-duty elements of steel, copper, stainless steel, or alloy, all in correct watt density, have proper chemical characteristics.
- Next: Portable Tank Immersion Heaters require no tank openings. They put the heat down to the very bottom of the tank—and they are constructed for trouble-free life with moisture, heat, and acid-resistant parts and joints.
- Next: Coiled over-the-side heaters, for full but shallow tanks, produce good circulation and uniform temperatures. Various sheaths resist practically all chemicals.
- Next, at right front: a High-capacity Flange-Type Heater packs many kilowatts in a small space, particularly in water solutions. The heavy-duty flange simplifies installation.

So what's YOUR heating problem? Just call your CHROMALOX representative, listed opposite. He has the fast, clean, safe, accurate, economical ELECTRICAL ANSWER, backed by the world's largest stock of industrial electric heaters for immediate shipment, plus factory design engineering services.

2640-A

CHROMALOX® Electric Heat

Edwin L. Wiegand Company

7518 Thomas Boulevard, Pittsburgh 8, Pennsylvania • CHurchill 2-6400

For more facts circle 567 on Reply Card

Call Chromalox

for the man with the ELECTRICAL ANSWERS to your heating problems

ATLANTA 9, GA.
Applebee-Church, Inc.
1389 Peachtree St., N.E.
TRinity 5-7244

BALA-CYNWYD, PA.
J. V. Calhoun Co.
349 Montgomery Ave.
MOhawk 4-6113
GReenwood 3-4477

BALTIMORE 18, MD.
Paul B. Renoff Co.
333 E. 25th St.
HOpkins 7-3280

BINGHAMTON, N. Y.
R. P. Smith Co., Inc.
94 Henry Street
Phone 4-7703

BLOOMFIELD, N. J.
R. L. Faber & Associates, Inc.
1246 Broad Street
EDison 8-6900
New York: WOrth 4-2990

BOSTON 11, MASS.
Leo C. Pelkus and Co., Inc.
683 Atlantic Ave.
LIberty 2-1941

BUFFALO 2, N. Y.
Niagara Electric Sales Co.
505 Delaware Avenue
SUmmer 4000

CHARLOTTE 2, N. C.
Ranson, Wallace & Co.
116½ East Fourth St.
EDison 4-4244
FRanklin 5-1044

CHATTANOOGA 1, TENN.
H. R. Miles and Associates
P. O. Box 172
Phone 5-3862

CHICAGO 6, ILL.
Fred I. Tourtelot Co.
407 S. Dearborn Street
HArrison 7-5464

CINCINNATI 8, OHIO
The Smysor Company
1046 Delta Avenue
TRinity 1-0605

CLEARWATER, FLA.
J. J. Galleher
617 Cleveland Street
P. O. Box 1376
Phone 3-7706

CLEVELAND 13, OHIO
Anderson-Bolds, Inc.
2012 W. 25th Street
PRospect 1-7112

DALLAS 28, TEXAS
L. R. Ward Company
3009-11 Canton Street
RIverside 1-6279

DAVENPORT, IOWA
Volco Company
215 Kahl Bldg.
Phone: 3-2144

DENVER 2, COLO.
E. & M. Equipment Co.
2415 15th Street
GLendale 5-3651
GEnesee 3-0821

DES MOINES 14, IOWA
Midwest Equip. Co. of Iowa
842 Fifth Avenue
CHerry 3-1203

DETROIT 38, MICH.
Carman Adams, Inc.
15760 James Couzens Hwy.
UNiversity 3-9100

HOUSTON 3, TEXAS
L. R. Ward Company
3605 Polk Avenue
CApitol 5-0356

INDIANAPOLIS 4, IND.
Couchman-Conant, Inc.
627 Architects & Builders Bldg.
MElrose 5-5313

KANSAS CITY 6, MO.
Fraser D. Moore Co.
106 E. 14th Street
Victor 2-3306

LOS ANGELES 15, CALIF.
Montgomery Brothers
1053 South Olive Street
RIchmond 7-9401

MIDDLETOWN, CONN.
Dittman and Greer, Inc.
33 Pleasant Street
DIamond 6-9606

MILWAUKEE 3, WIS.
Gordon Hatch Co., Inc.
531 W. Wisconsin Avenue
BRoadway 1-3021

MINNEAPOLIS 4, MINN.
Volco Company
831 South Sixth Street
FEderal 6-3373

NASHVILLE 4, TENN.
H. R. Miles and Associates
2500-B Franklin Road
CYpress 2-7016

NEW YORK CITY, N. Y.
See "Bloomfield, N. J."

OMAHA 2, NEB.
Midwest Equipment Co. of Omaha
1614 Izard Street
ATlantic 7600

PHILADELPHIA, PA.
See "Bala-Cynwyd, Pa."

PITTSBURGH 6, PA.
Woessner-McKnight Co.
1310 Highland Bldg.
115 S. Highland Avenue
EMerson 1-2900

PORTLAND 9, ORE.
Montgomery Brothers
1632 N.W. Johnson Street
CApitol 3-4197

RICHMOND 26, VA.
O. M. Thompson
Westhampton Station
P.O. Box 8762
ATlantic 8-8758

ROCHESTER 4, N. Y.
Niagara Electric Sales Co.
133 Clinton Avenue, South
HAmilton 6-2070

ST. LOUIS 1, MO.
C. B. Fall Company
317 N. 11th St., Suite 1001
CHestnut 1-2433

SAN FRANCISCO 3, CALIF.
Montgomery Brothers
1122 Howard Street
UNderhill 1-3527

SEATTLE 4, WASH.
Montgomery Brothers
911 Western Avenue
MAin 4-7297

SYRACUSE 6, N. Y.
R. P. Smith Co., Inc.
2507 James Street
HOward 3-2748

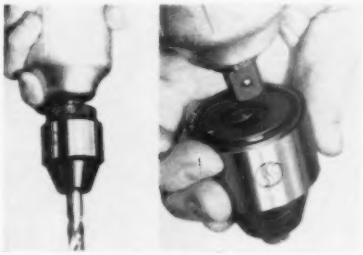
WICHITA 2, KANS.
Fraser D. Moore Co.
Room 211 Derby Building
352 N. Broadway
AMherst 2-5647

NEW PRODUCTS

(Begins on page 120)

18—CHUCK adapts impact wrench drilling jobs

Designed to make an impact wrench into an effective heavy-duty drilling tool, the Supreme Impact Wrench Chuck fits ½-in. square drive tools



and holds ⅛- to ½-in. drills. It features a keyless gripping action. According to manufacturer, this chuck has the ruggedness to withstand the shock created by impact power tools, and will operate accurately and with minimum care. Supreme Products Corp.

19—PENETRATING OIL is odorless, non-flammable

Jet-Aer Penetrating Oil is described as quick acting, odor-free and non-flammable. Manufacturer says that it is made with silicones, contains no film-forming petroleum oil, and will loosen rust and corrosion on contact as well as lubricate. It comes in a handy aerosol can. Jet-Aer, Inc.

20—SOLENOID VALVES, two- and three-way models

Design and operating features providing greater flow, higher operating pressure, longer life and ease of maintenance are announced for these solenoid valves. Series A, now available in ⅛- and ¼-in. pipe sizes, includes two- and three-way directional solenoid valves in both normally closed and normally open types. They are offered with stainless steel body or brass body with stainless steel seat insert. Grommet or conduit type electrical outlets are available. Series B is a midget, two-way normally closed valve with ⅛-in. NPT ports highlighting a design providing more flow and higher operating pressures. It has a brass body with stainless steel seat insert and grommet type electrical outlet.

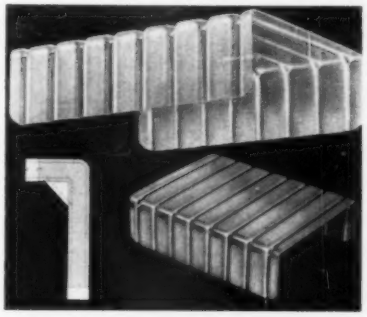
Both models are designed for air, oils, cold and hot water and gases. They are designed to operate at temperatures from -20 to 200 F ambient and -20 to 175 media. They may be serviced without removal from the line and without special tools. They have two mounting holes in base of body, and will operate in any position. C. A. Norgren Co.

21—BREAK-IN COATING is anti-friction phosphate

Turcoat 3557 provides a phosphate coating of up to 3000 milligrams per square foot on iron, steel or cadmium, it is announced. A "break-in" coating for moving parts, Turcoat 3557 is also suggested for rust-proofing of small parts to be oiled in mass production, and is said to serve as an excellent foundation for paint. Manufacturer says it is well suited for coating pistons, gears, clips, bolts, fasteners, tools, compressor shafts, other parts. It is applied by immersion or tumbling. The resulting coating is described as one of manganese, zinc and iron phosphates. Turco Products, Inc.

22—M H PLATFORMS are braced for more strength

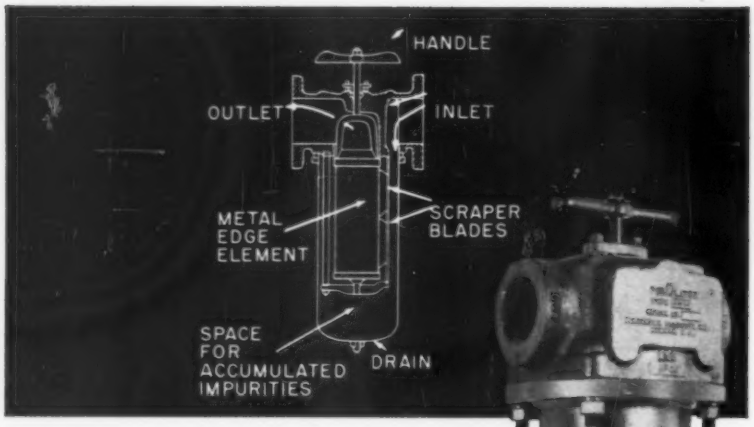
Developed to eliminate a common weakness of steel material handling platforms is a formed-in knee brace



now incorporated in this company's standard platform and box platform units. This knee brace, at every corrugation at the bend in the platform, is said to prevent cracking and minimize leg folding under heavy loads. It also affords greater rigidity and ability to withstand shock abuse. The Powell Pressed Steel Co.

23—RESPIRATOR protects against excessive heat

Developed for use in areas where intense heat may endanger health—as in kilns and ovens where temperatures range from 150 to 300 F, the new Thermalair Respirator is also suggested for emergency entrances in furnaces and boilers for repair work. This respirator is described as a simple device capable of exchanging overheated air for res-



This one standard Purolator filter is

EXACTLY RIGHT for all these fluids:

- inks
- paints
- varnishes
- food products
- greases
- process fluids
- fuel and lube oils

SPECIFICATIONS: This Purolator filter—model G-141J—is designed for filtration in a range upward of 40 microns.

It can be installed on pressure or suction side of pump.

It is recommended for capacities of from 6 to 200 GPM, dependent on viscosity. Spacing varies from .0010 to .020.

Relief valves set from 10-12 (generally 15 to 20) to 50 PSI are incorporated in several models.

Motor driven knife blade to clean element can be furnished whenever conditions make manual rotation impractical.

Maximum pressure: 125 PSI; Weight: 37 lbs. Equipped with simplex full-flow metal element oil strainers.

Available in all stainless steel construction for corrosive liquids, process fluids, food products.

If this filter's specifications recommend it for a problem of yours, write for catalog sheet to Dept. PF2-123.

Filtration For Every Known Fluid

PUROLATOR

PRODUCTS, INC.

Rahway, New Jersey and Toronto, Ontario, Canada

For more facts circle 568 on Reply Card

NEW PRODUCTS

(Begins on page 120)

pirable air. The cartridge contains a metal screen heat exchanger designed to absorb heat when the user inhales. Absorption is claimed adequate to cool incoming air to approximately body temperature. As user exhales, the stored hot air is forced out. According to manufacturer, the Thermalair is inexpensive, weighs only 6 oz, has low breathing resistance, and can be washed and sterilized. American Optical Co.

24—LIFTING PLATFORM for overhead maintenance

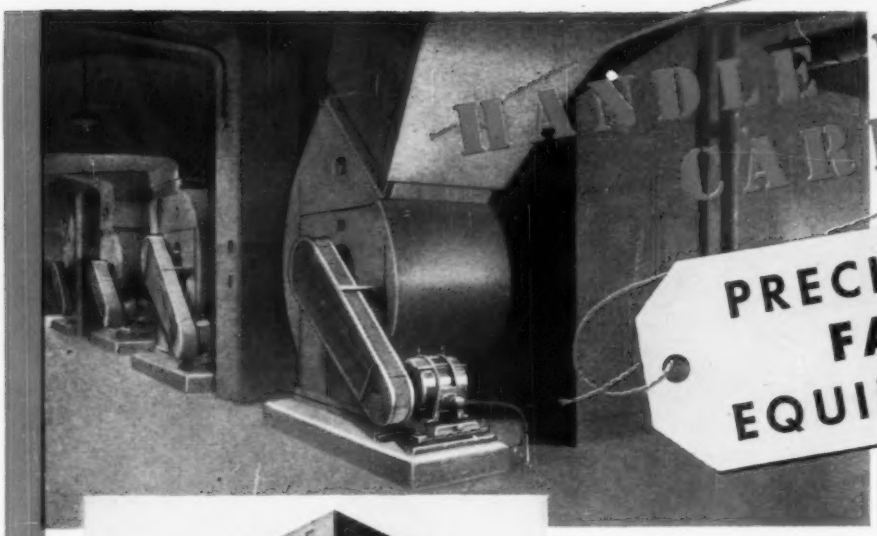
The Hydro-Hi Lift unit is designed for the maintenance and cleaning of lighting fixtures, cleaning and painting of walls, windows and stockroom

operations where high and frequent or continuous lifting is required. Controlled from the 6-ft platform, the unit is a 400-lb capacity and turns 360 deg either clockwise or counter-clockwise. Unit is steered, moved and braked with the push-button Hydro-Power wheel. Power is furnished by a heavy duty battery with a built-in charger The unit is available for heights to 25 ft. The Stratton Equipment Co.

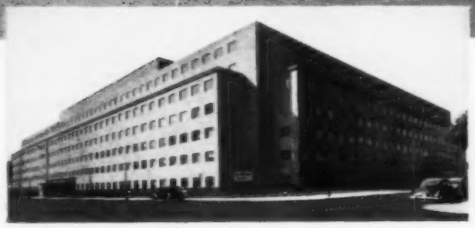
To receive product data circle item numbers on the handy Reader Service Cards provided on pages 161-162.

25—HYDRAZINE PRODUCT treats boiler feedwater

Hyzeen is announced as a 35 per cent aqueous solution of hydrazine that is non-flammable and has neither flash nor fire point. Manufacturer says it is safe and presents no unusual handling or storage problems. According to manufacturer, Hyzeen is preferred over sodium sulfite for



Battery of Type AP Fans, Sizes 365 to 445, Installed In General Accounting Office, Washington, D. C.



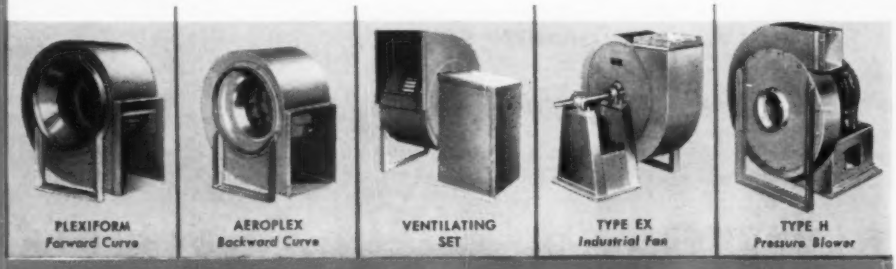
Get the fullest value and benefit from the careful design, features of construction, and balance built into the equipment by the factory . . . When installing Fans, take note of these helpful pointers:

- Bolt fans evenly to a substantial, level foundation. Fastenings should be carefully located to match the base and avoid warping.
- Good vibration isolation, selected to suit operating conditions, reduces noise, protects equipment and building against damage from vibration.
- Inlet and Outlet connections should be carefully aligned to avoid warping fan or ducts. Flexible connections help to offset normal variations in duct alignment, reduce noise transmission.
- Drive auxiliaries should be of highest quality, well balanced and aligned. Check for uniform tension on multiple-belt drives.
- Drive Guards are desirable for safe operation, and should be checked for conformity to applicable construction code.
- Check fit of close running parts, such as fan wheel to cone, sheaves to guards, before starting up. Fit may have been disturbed during erection.
- Check all operating instructions. Be sure all bearings are properly lubricated before running.
- Check for correct rotation. See that motor or prime mover is running correctly before connecting to fan.

"FAN-A-GRAFICS For Equipment Engineers"

— A Complete Guide for Specifying, Buying, and Operating Centrifugal Fans — is available at your request. Write for your copy today!

Bayley



Engineered Air-Handling Equipment

See Bayley Exhibit — BOOTH 621

14th International Heating & Air-Conditioning Exposition Jan. 26-29, 1959

Philadelphia

Jan. 26-29, 1959

BAYLEY BLOWER COMPANY

1825 So. Sixty-Sixth St., Milwaukee 14, Wisconsin

For more facts circle 569 on Reply Card

In Dust Collection Systems...

SF Precipitator at a steel plant.

design
makes the difference

Higher efficiency of Buell 'SF' Electric Precipitators is the result of exclusive engineering features. For example, Buell's *Spiralectrodes* emit 50% to 100% more electrons than other types . . . and *maintain* their efficiency. Positive gas flow control through adjustable baffles prevents scouring and eddying. And Buell's Unique Continuous Cycle Rapping practically eliminates "puffing".

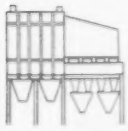
BUELL CYCLONES

Lower installation cost of Buell's time-proved simplified design makes erection faster and easier. Spiralectrodes, for example, are self-tensioning, require no weights. Flexibility of power supply means easier installation, operating safety.

"SF" ELECTRIC PRECIPITATORS

Lower maintenance cost is the result of many details of superior design. And sectionalized design permits shutting down part of a unit without interrupting service in the rest of the unit.

Get full information: write for a copy of "Buell SF Electric Precipitators", a 22-page booklet. Write to Dept. 47-L, Buell Engineering Co., Inc., 123 William Street, New York 38, N. Y.



PRECIPITATOR-CYCLONE COMBINATIONS

buell®

Experts at delivering Extra Efficiency in

DUST COLLECTION SYSTEMS

For more facts circle 570 on Reply Card

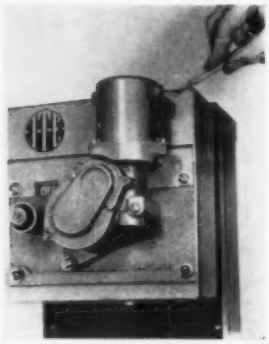
NEW PRODUCTS

(Begins on page 120)

removal of oxygen from feedwater for high pressure boilers, and it is a proper oxygen scavenger where demineralized or evaporated make-up water is used and where it is important to maintain low boiler water solids. Hyzeen reacts with oxygen without adding dissolved solids to the boiler water, it is noted. Betz Laboratories, Inc.

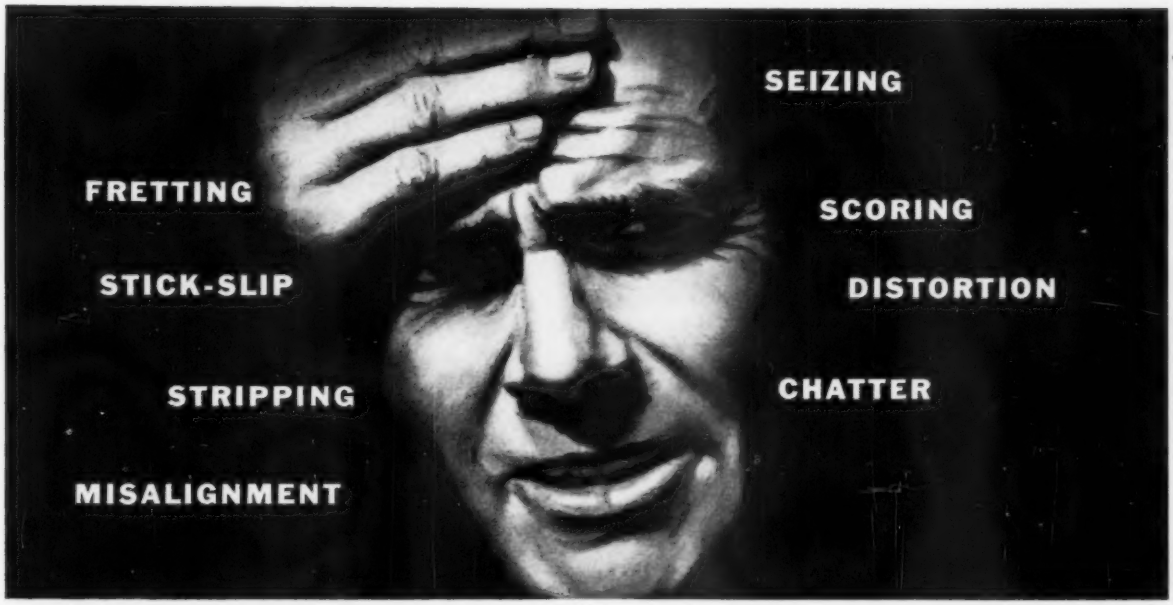
26—MOTORIZED UNIT for remote breaker control

This motorized mechanism is designed to make possible both remote control and automatic transfer systems using molded-case circuit breakers. The mechanism can be wired for any operation systems desired it is stated, and can be mounted on new or existing models of company's molded-case breakers without removing them from service. These compact units add only 6 in. to the depth of a breaker. They are suggested for use on circuit breakers in switchboards, control centers and individual enclosures, etc. where remote operation is required. They serve to provide positive remote electrical actuation for the breakers —including current-limiting Cordon models—in continuous current ratings from 70 to 800 amp and voltages to 600 v a-c and 250 v d-c. In addition to their flexibility, the mechanisms are reported to offer high-speed operation, safe emergency manual operation, easy access to instantaneous trip adjustments and simple installation. I-T-E Circuit Breaker Co.



27—GROUTING CEMENT is strong and fast setting

For fastening machinery, handrails, seats, fixtures or other equipment to concrete by means of anchor bolts, Anchor-Tite is described as a free-flowing, rapid-setting welding agent



WHICH LUBE HEADACHE IS YOURS?

Molysulfide® T.M. Grease can cure it in minutes

How is it possible? . . . Simply wipe a thin coating of Molysulfide grease—or Molysulfide concentrate—on the surfaces to be lubricated. The Molysulfide quickly forms a high strength layered film that prevents metal to metal contact, and lubricates even under severe load conditions . . . where conventional lubricants are wiped off or forced entirely out of the critical area.

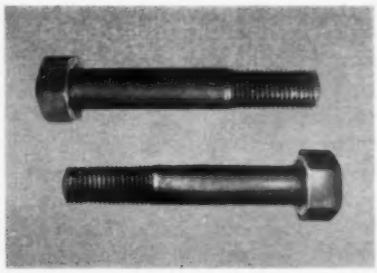
Four main properties of Molysulfide explain why it is so effective: (1) It is as slippery as ice. (2) Resists excessive pressures. (3) Lubricates over a wide temperature range −275°F to 850°F. (4) Sticks "like glue" to metal.

No other known substance equals Molysulfide heavy-duty lubricant as an immediate cure for galling and seizing of threaded connections . . . scoring and distortion of press fits . . . stick-slip or chatter on machine ways . . . fretting on splines . . . or for similar troubles involving gears, cams, collets and chucks.

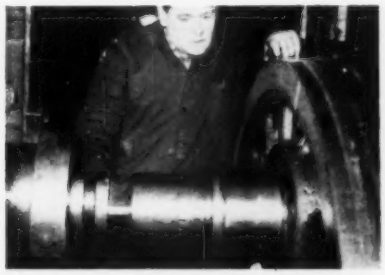
Which lube headache can it solve for you? You can discover in virtually a single application.

Order a pound of Molysulfide, in either powder or concentrated grease form, from any one of the manufacturers below.

No slip-stick action at low speeds on machine tools gibs and ways when they're greased occasionally with Molysulfide heavy-duty lubricant.



No seizing. Service dismantling of powerhouse generator reveals bolts in top condition 21 months after Molysulfide lubrication.



Press fitting without galling. Both assembly and disassembly of locomotive drive journal go smoothly when Molysulfide lubricant is used.

CLIMAX MOLYBDENUM

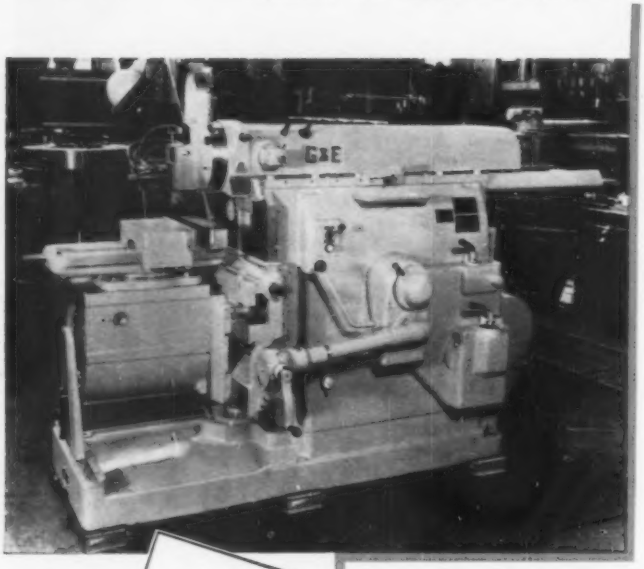
Heavy-duty lubricants containing Molysulfide are now available nationally. Order from any of these well-known manufacturers:

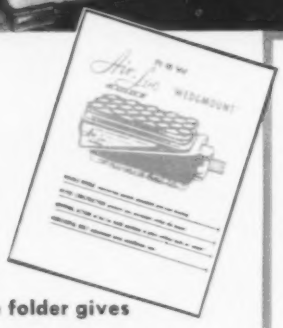
Acheson Colloids Co., Port Huron, Michigan • The Alpha Molykote Corp., 15 Harvard Ave., Stamford, Connecticut • Basco, Inc., 730 W. Jackson St., P.O. Box 461, Milwaukee 1, Wisconsin • Bel-Ray Co., Green Village Rd., Madison, New Jersey • Bemol, Inc., 131 State St., Boston 9, Massachusetts • Fiske Bros. Refining Co., 1500 Oakdale Ave., Toledo, Ohio • Jet Lube, Inc., 3093 N. California St., Burbank, California • McGee Chemical Co., 8000 West Chester Pike, Upper Darby, Pennsylvania

For more facts circle 571 on Reply Card

Can You Hold Your Shaper Without Bolts?

YES- with new WEDGMOUNT which anchors Shapers, Presses, etc. *and* permits precision leveling!





Free folder gives complete facts about

WEDGMOUNT with—

"Air-Loc" patented vinyl, sisal and cork pads top and bottom grip machines to floors

•

double-wedge construction which permits immediate precision leveling

•

keyed construction which prevents movement *within* the mount

•

sizes available thru distributors, and prices

This Gould & Eberhardt 24" Industrial Universal Shaper, operating at 120 cuts per minute with a 4" stroke, is installed without bolts on a new type machinery mount called WEDGMOUNT. A dial indicator at the base of the shaper showed a total oscillation of only .022" during operation, and no "walking." The 7,800 lb. machine is installed on six WEDGMOUNTS, each type 3" x 6" S. Before operation, precision leveling is achieved by simple adjustment of a bolt within each mount. Top and bottom of each mount is surfaced with patented "Air-Loc" pads, which provide the high degree of friction required to hold the machine in place despite its strong lateral thrust.

Air-Loc® WEDGMOUNT

write to... **Clark-Cutler-McDermott Co.**

115 West Central Street • Franklin • Massachusetts

For more facts circle 572 on Reply Card

NEW PRODUCTS

(Begins on page 120)

for concrete and masonry. It is also suggested as a quick-patch for small, shallow depressions and cracks in concrete floors. According to manufacturer, Anchor-Tite's dominant feature is the expanding action that occurs during setting, to assure permanent tying down of the patch to the concrete. The product is reputed to be oil-resistant, non-shrinking, self-bonding and self-leveling. Tests are reported to indicate a compressive strength of over 4500 psi after a 1-hr set, and ready adherence to old or new concrete without bonding materials. Anchor-Tite is applied cold, can be prepared on the job. The Garland Co.

28—PLANNING KITS of tapes, charting materials

Three Graph-A-Plan Kits contain necessary supplies for basic charting in various fields: office layout, statistics; organization and flow.

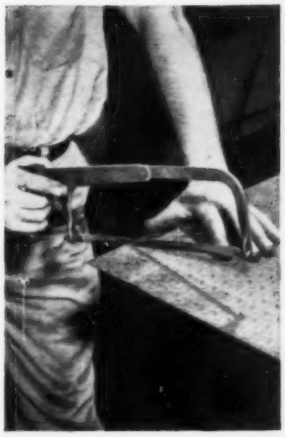
Each "do-it-yourself" kit is available with transparent materials suitable for any one of the diazo reproduction processes, or with opaque materials for use in photocopying reproduction. Labelon Tape Co., Inc.

29—SCRUBBER-VACUUM for larger-area cleaning

Claimed capable of cleaning up to 64,500 sq ft of open floor area an hour, the 72-F is a rider-type combination scrubber-vacuum for industrial plants having a minimum of 50,000 sq-ft areas to be cleaned. It removes dirt and grime by action of four 18-in. brushes operating at 180 rpm under variable pounds of pressure on the floor. The brushes agitate a cleaning solution dispensed from a 150-gal tank. A giant-sized V-shaped squeegee funnels loosened dirt into a 150-gal pickup tank via a 75 cfm vacuum. The 72-F is powered by an air-cooled 27-hp gas or propane engine; brush and squeege

ORDINARY SHOP TOOLS

can cut, bend, hammer, drill, shape, roll saw, snip



SMALL PATTERN INLAND 4-WAY® SAFETY PLATE

You don't have to spend a penny for special equipment. With just the normal tools available in your plant you can work with Small Pattern Inland 4-WAY SAFETY PLATE—use it for dozens of maintenance jobs.

Small Pattern 4-WAY SAFETY PLATE is only 18 gage, weighs only 2.4 pounds per square foot, yet has all the slip-resistant traction and safety features that has made regular 4-WAY SAFETY PLATE famous. Small Pattern 4-WAY costs less to use—less per square foot covered—than other similar materials.

It's tough, rugged, built for years of wear, yet it is light and flexible enough to carry wherever needed—work into any required form. Try it. It's firesafe, non-absorptive, easy to keep clean—the ideal material for fast, easy, low-cost maintenance use.

a few of the ways you can use light gage Safety Plate:

kick plates
tool racks
wall covering
treads on wood steps
round or square column protectors
thresholds
truck beds
resurfacing
machines tool tables
covering over worn cement stairs

AVAILABLE FROM YOUR STEEL SERVICE CENTER in 18 gage, cut to your needs in widths up to 42" and lengths up to 152".

AMERICAN STEEL WAREHOUSE ASS'N.

INLAND

4-WAY SAFETY PLATE

® Registered U. S. trademark

INLAND STEEL COMPANY
30 West Monroe Street, Chicago 3, Illinois

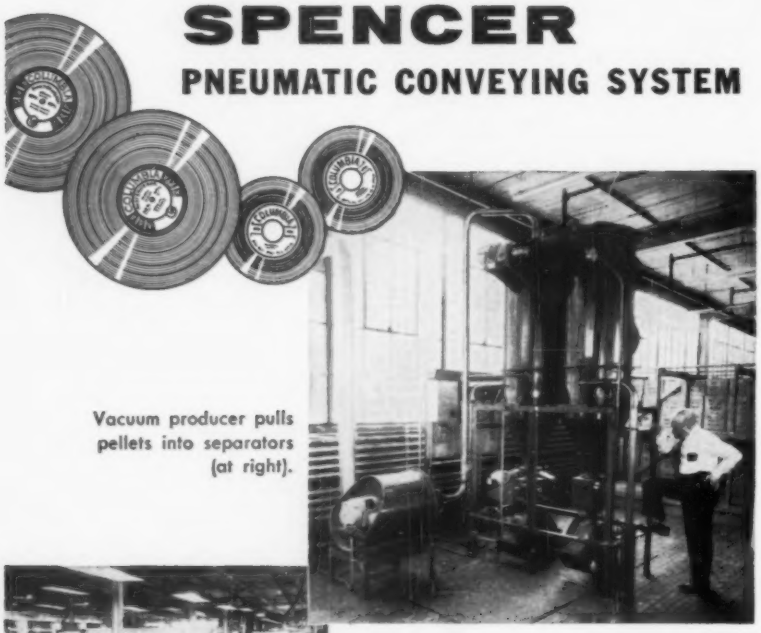
For more facts circle 573 on Reply Card

production
Sweet 1 Music at Columbia Records Plant . . .

Thanks to a

SPENCER

PNEUMATIC CONVEYING SYSTEM



Vacuum producer pulls pellets into separators (at right).

Production line of record presses fed by Spencer system.

From plastic pellets to completed discs, there is no manual handling of materials here at the Columbia Records plant, Bridgeport, Conn.

Pellets are picked up at the pelletizer, conveyed to a large hopper. From there, material is blown through a piped circuit to small "feed" hoppers on each automatic record pressing machine.

Advantages of the Spencer system are many and measurable:

Savings on Material Handling Costs—Manual and mechanical hopper-loading is eliminated, man-power freed for productive tasks.

Increased Production—No "down time" on record presses due to lack of material.

No Contamination of Material—Dirt, metal chips, glass, etc. cannot enter the piped system.

For recommendations (and suggested piping lay-out) on a SPENCER system to solve your needs, write outlining your requirements.

Request Bulletin No. 143-B

The SPENCER TURBINE COMPANY
HARTFORD 6, CONNECTICUT

ALSO MANUFACTURERS OF: STATIONARY VACUUM SYSTEMS · PORTABLE VACUUM CLEANERS · BLOWERS

For more facts circle 574 on Reply Card

NEW PRODUCTS

(Begins on page 120)

movements are actuated by a hydraulic power takeoff system controlled by the operator. With an overall length of 114 in. and width of 72 in., the 72-F can turn in its own length and work in a 10-ft aisle. It requires one operator, works at 2 to 3 mph and travels at speeds to 15 mph. Finnell System, Inc.

30—RADIANT HEATER is a ceiling mounted unit

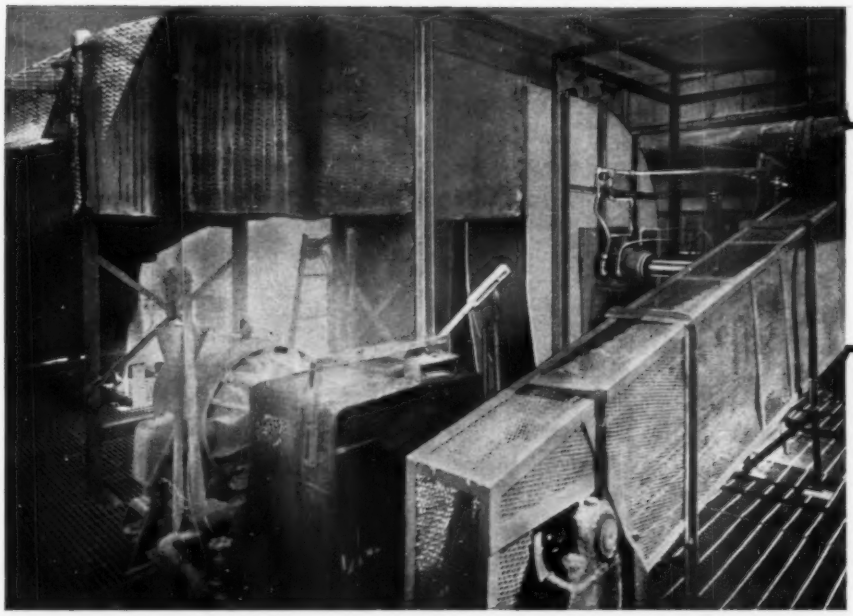
While suitable for general application, the Chromalox Type SKR Electric Heater is reported ideal for hard-to-heat spots, particularly where overall room temperature cannot be maintained. Comfort is induced by direct radiation on individuals and surrounding objects—desks, work benches, machinery etc. —which in turn become generators of radiant heat. The heaters avoid heating of vast areas of space to ac-

complish equivalent results, it is pointed out. They have two fixture stems which provide minimum 12-in. spacing below combustible ceilings, and each stem has a canopy and conduct attachment fixture.

The Type SKR may be used for "spot heating" in problem areas or for heating entire rooms—as supplemental or sole heat source. With addition of an input controller, the radiation of one or several heaters can be dialed to suit individual heat preferences. Also, thermostats may be used in conjunction with the heaters and input controllers to automatically control room temperature. The heater comes in six heated lengths from 16½ to 78 in., with ratings from 800 to 3600 for standard voltages. Edwin L. Wiegand Co.

31—SAFETY SOLVENT cleans electrical equipment

K09, a cleaner and degreaser for electrical equipment, is reported especially useful in cleaning motors. The motor, while running, can be submerged in this cleaner and will come out clean, says manufacturer,



One of several Clarage Type XL Fans used in this application. Fan equipped with stainless steel wheel and V-belt driven from a hydraulic coupling.

Clarage Fans have what it takes

for this tough exhaust assignment in the production of titanium dioxide

Exhausting 800° F gases from rotary calciners through scrubber units and electrical precipitators to the atmosphere.

That's the demanding task this large chemical manufacturer gave Clarage Type XL Fans.

What kind of a job evaluation does Clarage receive? Several repeat orders furnish the answer. In fact, three additional Clarage Fans will soon be installed in a major expansion at this plant.

You, too, will find it pays dividends to choose the fan name of quality — Clarage. Call us in for capable assistance on your next requirements in the air handling and conditioning field. It's characteristic of Clarage equipment to prove out successfully no matter how exacting the application. CLARAGE FAN COMPANY, Kalamazoo, Michigan.

CLARAGE ... *dependable equipment for making air your servant*

SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES • IN CANADA: Canada Fans, Ltd., 4285 Richelieu St., Montreal

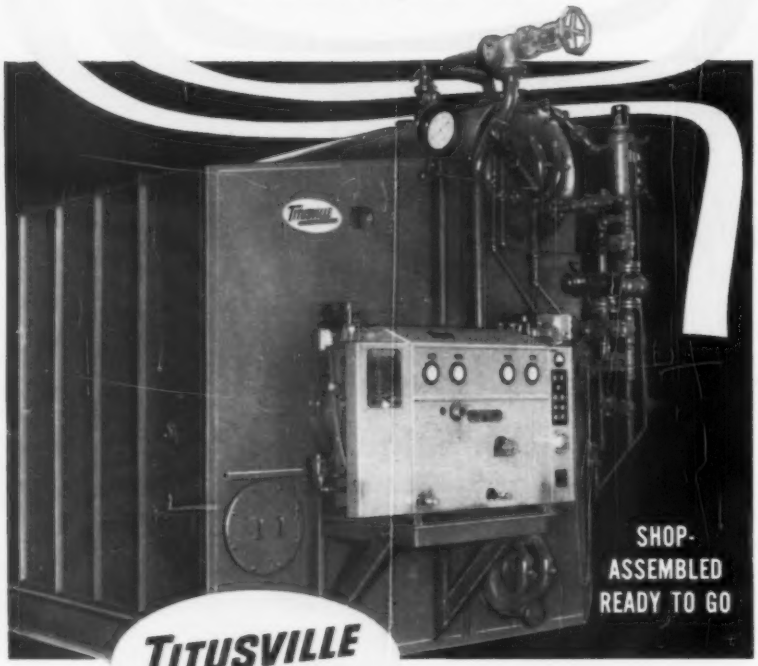
For more facts circle 575 on Reply Card

10,000 pounds

to 60,000 pounds

of quality

steam per hour



TITUSVILLE
BOILERS SINCE 1860

TYPE WTP

PACKAGED STEAM GENERATOR

Write for your copy
of new Bulletin B-3255

The Titusville WTP Steam Generator's ease of installation and simplicity of operation are matched by the economy and dependability in operation that make this water-tube unit a standout in value year after year! Completely shop-assembled, requiring no special foundations, high stack or induced draft fan, the Titusville WTP is ready to serve you the moment service connections are made. *Let us discuss your needs.*

THE TITUSVILLE IRON WORKS CO.

A Division of

Struthers Wells

TITUSVILLE, PENNSYLVANIA

Manufacturers of A Complete Line of Boilers for Every Heating and Power Requirement

Plants at Titusville, Pa. and Warren, Pa.

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BOILER DIVISION
BOILERS for Power and Heat . . . High and Low Pressure . . . Water Tube . . . Fire Tube . . . Package Units

PROCESSING EQUIPMENT DIVISION
Crystallizers . . . Direct Fired Heaters . . . Evaporators . . . Heat Exchangers . . . Mixing and Blending Units . . . Quick Opening Doors . . . Special Carbon and Alloy Processing Vessels . . . Synthesis Converters

FORGE DIVISION
Crankshafts . . . Pressure Vessels . . . Hydraulic Cylinders . . . Shafting . . . Straightening and Back-up Rolls

For more facts circle 576 on Reply Card

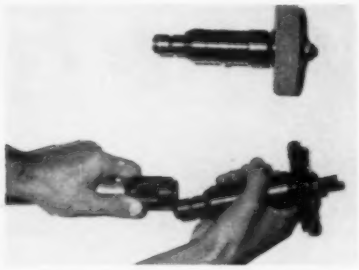
NEW PRODUCTS

(Begins on page 120)

no matter how wet, greasy or fouled up—and the solvent adhering to the motor will evaporate rapidly. If the motor is so waterlogged or fouled that it will not start, submersion in solvent for an hour or more is suggested. When water, grease or grime are dispersed and the motor will start, it can then be submerged while running for a final cleaning. Large motors, switchboards, communication systems can be cleaned by spraying. The cleaner is claimed to have a high flash point and low toxicity, and to contain no corrosive ingredients. KOR Corp.

32—HANDPIECE connects to the flexible shafts

This quick-disconnect handpiece is for use on company's flexible shaft machines and flexible tool shafts. It can speed production where the



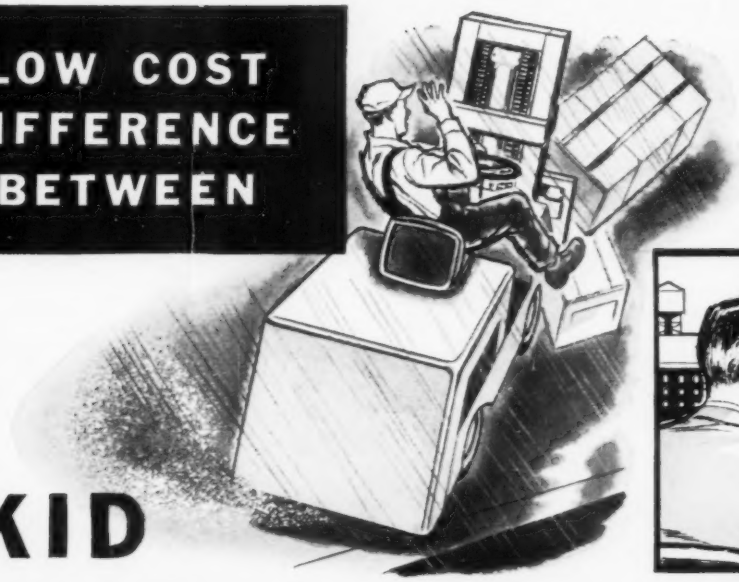
same flexible shaft is used for two or more operations—to switch from wire brush to grinding wheel, for example, you pull off one handpiece and snap on the next one. The handpiece has high speed ball bearings and is held by a spring and ball-lock mechanism in a coupling attached to the tool shafts. Catalog 59 gives details. Stow Mfg. Co.

Reader Service Cards on pages 161-162 make it easy to get further information on any of these products. Just circle the item numbers of the products you would like to know more about.

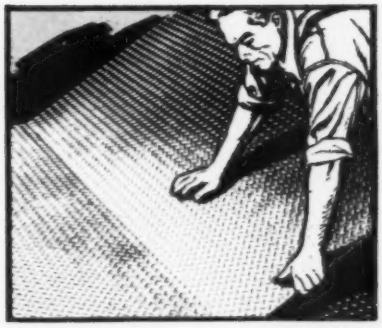
33—INDICATING CONTROL, adjustable throttling

An interchangeable mercury thermal element is the sensing medium in this pneumatic indicating control. The mechanism, by throttling the pressure in a 15-lb air line, positions

LOW COST DIFFERENCE BETWEEN



SKID



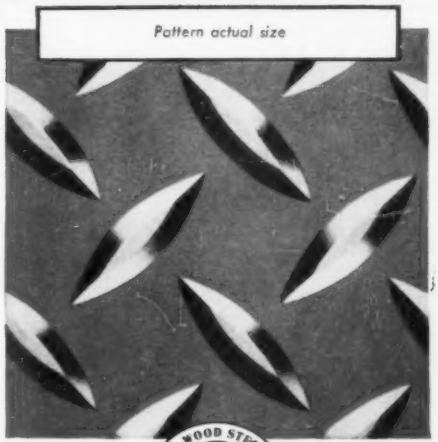
NO SKID

Eliminate high-cost accidents with low-cost Super-Diamond. Yes, A.W. Super-Diamond safety floor plate replaces DANGER with SAFETY wherever hazardous slipping conditions occur. Here's why!

- Raised steel, diamond-shaped figures give *maximum slip-skid resistance from all angles of approach.*
- Tough rolled steel construction lasts the life of the installation.
- Non-directional pattern—no matching problems—minimum waste.
- Easily fabricated for quick installation.
- No maintenance problems—cleans, drains rapidly.
- Use as independent flooring or flooring overlay.

Get complete . . . free . . . information, that may save you thousands! Write today on your company letterhead to Dept. SD-E9

Pattern actual size



ALAN WOOD STEEL CO. ESTABLISHED A.W. 1826 CONSHOHOCKEN, PA.

A.W. SUPER-DIAMOND

ROLLED STEEL FLOOR PLATE

ALAN WOOD STEEL COMPANY • CONSHOHOCKEN, PA.

Wherever oil, grease, or other substances raise special slipping accident hazards, we suggest a check on the special non-slip qualities of A.W. ALGRIP—the world's only abrasive rolled steel floor plate.

Other Products: A.W. ALGRIP Abrasive Rolled Steel Floor Plate—Plates—Hot and Cold Rolled Sheet and Strip—(Alloy and Special Grades)

For more facts circle 577 on Reply Card

A COMPLETE LINE OF
LIVE ROLLER CONVEYERS
engineered and standardized by

MATHEWS

A belt-driven Live Roller Conveyer with remotely-controlled air-operated deflectors is the heart of this modern shipping room dispatch system.

Mathews belt-driven Live Roller Conveyers are widely applied in modern package-handling systems. Packages deflect well from live roller lines, and they can be located at any reasonable level between the floor and ceiling.

Live Roller Conveyers can be reversible, and add greatly to the flexibility of the conveyer systems of which they are a part.

Write for Bulletin G.P.53 and Catalog 856 today.

MATHEWS CONVEYER COMPANY

GENERAL OFFICES . . . . . ELLWOOD CITY, PENNSYLVANIA
PACIFIC COAST DIV. . . . MATHEWS CONVEYER COMPANY WEST COAST, SAN CARLOS, CALIFORNIA
CANADIAN DIVISION . MATHEWS CONVEYER COMPANY, LTD., PORT HOPE, ONTARIO.

MATHEWS
Over Fifty Years of Leadership in Mechanized Handling

For more facts circle 578 on Reply Card

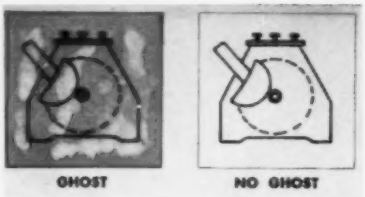
NEW PRODUCTS

(Begins on page 120)

an air-operated steam valve or other air-operated device. Features announced for the control are a readily adjustable throttling range, 3 to 20 per cent, and a built-in fail-safe device which provides for immediate and automatic shut-down of the air valve in case of failure of air supply to the control. It has a wide scale for both the setting and indicating pointer. Setting adjustment is by means of a knob on the outside of the case. Bulletin 342 gives further data. The Partlow Corp.

34—DRAFTING SYMBOLS have no lingering ghosts

Stanpat, a system of tri-acetate preprinted drafting symbols, is now available with a resin-base adhesive, identified by a red backing sheet, for use with tracing papers containing oils. It is pointed out that such

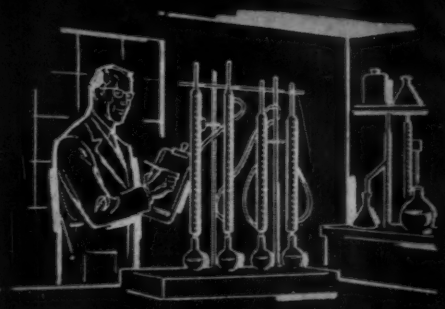


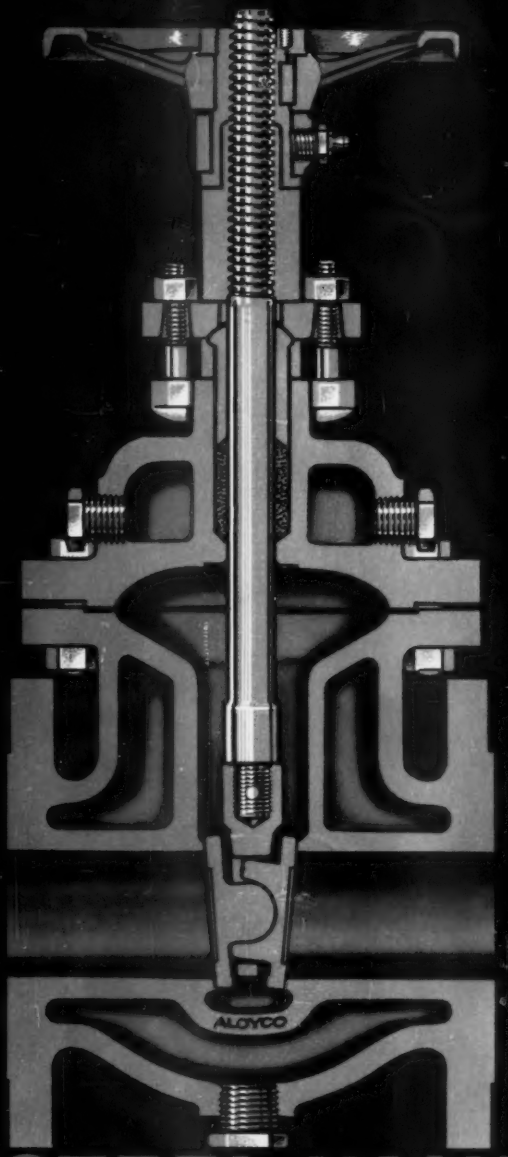
oils may be leached out by rubber-base adhesives and this leaching causes an annoying "ghost" when the complete drawing is reproduced. According to manufacturer, Stanpat's new resin-base adhesive does not leach out the oils and cannot cause ghosting. Stanpat will continue to be available with rubber-base adhesive, identified by green backing, and this type is recommended for papers not containing oils. Where tracing cloth is employed either adhesive base may be used, says company. Stanpat Co.

35—DRY CHEMICAL SYSTEMS with remote control

Remote control from a distant hose site pull box is a feature of these stationary dry chemical hose line systems. A pull-handle at the hose site serves to simultaneously open the valve, pressurize the tank, and fill the system with fire-killing chemical powder. Other features announced include space-saving installation, improved nozzles and valves, and use of Formula H, a chemical powder with heat- and moisture-resistance. Three models — in 150-, 300-, and 500-lb capacities — are

For more facts circle 579 on Reply Card →





Thirty years' research devoted exclusively to...

STAINLESS STEEL VALVES

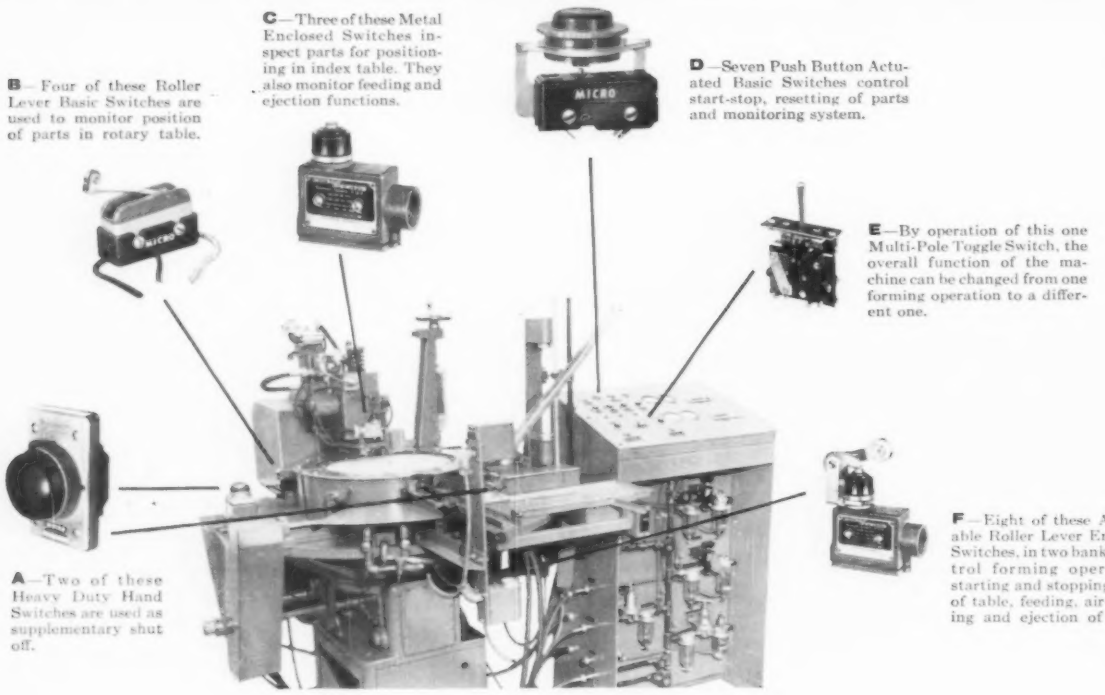
Aloyco's specialized research . . . in the field and in the lab . . . brings you a wealth of metallurgical information for successfully solving your corrosives-handling problems.

Coupled with continuing research in design, foundry and machining techniques, this Aloyco specialization results in new and better corrosion resistant valves for many specific applications. One example above: Aloyco completely jacketed valves (the first ever to be integrally cast in high alloys) are designed for viscous liquids and other fluids difficult to move at room temperatures.

Isn't your surest source of supply the one company with research, manufacturing and sales all devoted to Stainless Steel Valves exclusively?

ALLOY STEEL PRODUCTS COMPANY
Linden, New Jersey

MICRO SWITCH Precision Switches



B—Four of these Roller Lever Basic Switches are used to monitor position of parts in rotary table.

C—Three of these Metal Enclosed Switches inspect parts for positioning in index table. They also monitor feeding and ejection functions.

D—Seven Push Button Actuated Basic Switches control start-stop, resetting of parts and monitoring system.

E—By operation of this one Multi-Pole Toggle Switch, the overall function of the machine can be changed from one forming operation to a different one.

A—Two of these Heavy Duty Hand Switches are used as supplementary shut off.

F—Eight of these Adjustable Roller Lever Enclosed Switches, in two banks, control forming operation, starting and stopping point of table, feeding, air cleaning and ejection of parts.

One Operator per Week instead of Four

120 Man-hours Saved per Week

3000 Pieces per Hour instead of 1600

These remarkable savings are typical of those that can be affected on many machines by automating them with MICRO SWITCH Precision Switches.

In addition to the savings set forth above, this manufacturer of small, electrical products reports a total elimination of scrap parts and an additional saving of 175 hours per week in other departments.

Management in all types of business has accepted and proved the worth of this simple, inexpensive way to modernize existing equipment with MICRO SWITCH Precision Switches.

And, it *is* simple to do. Your own electrical maintenance men, cooperating with your plant engineering staff or with your local industrial electrical contractor, can do it.

We will venture to say that once you automate one machine in this way, you will soon apply MICRO SWITCH Precision Switches to other production tools in your plant.

Find out about this method of relieving the "profit squeeze" by contacting an authorized MICRO SWITCH distributor. You'll find his name in the Yellow Pages.

MICRO SWITCH . . . FREEPORT, ILLINOIS

A division of Honeywell

In Canada: Honeywell Controls, Ltd., Toronto 17, Ontario

Honeywell

MICRO SWITCH PRECISION SWITCHES

For more facts circle 580 on Reply Card

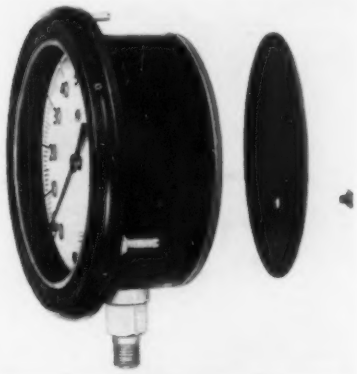
NEW PRODUCTS

(Begins on page 120)

available in compact package designs. Manufacturer points out that dry chemical powder is particularly suited for the protection of flammable liquids and electrical equipment. The Fyr-Fyter Co.

36—PRESSURE GAGE with solid metal front plate

In the Safe-T-Case Gage, departure from normal costruction consists mainly of a solid metal front plate which forms a partition or protecting wall between dial and tube. In the event of a bourdon tube rupture, this partition is designed to divert the force of a burst in a backward

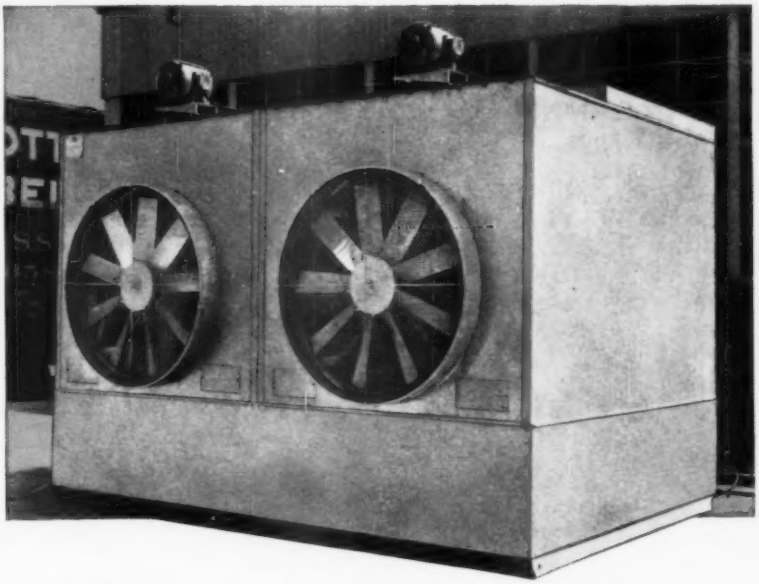


direction, away from the operator, where it is permitted to escape by deforming the back cover plate. The gasketed and deformable back plate covers the entire rear of the unit and can be forced open by a minimum pressure of 3 psi. For added safety in the event of a high pressure surge, this back plate, which is screwed in place, will not detach itself from the gage, it is noted. The readily removable plate provides access to the tube and movement assembly without necessity for removing the indicator dial. Four types of bourdon tubes meet most conditions. Helicoid Gage Div., American Chain & Cable Co., Inc.

37—COMPRESSORS, single-stage, centrifugal units

For refinery and petrochemical applications, this line of centrifugal compressors includes Type OM, for providing air service at low discharge pressures, and Type OPB for handling gas and air applications at higher discharge pressures. Sizes cover the 1200 to 80,000 cfm range with input horsepowers from 10 to 2500 bhp. Discharge pressures to 900

NEW LOW-COST APPROACH TO PROCESS WATER COOLING



COST OF WATER CONSERVATION IS DOWN! The initial investment, installation and operation costs of these new dual model Aquatowers is so low that no plant can afford a "hot spot" that wastes 200 to 400 gallons of water per minute. They make water wasting impractical, unprofitable.

These large capacity packaged cooling towers reach the job completely assembled, ready for work—require only simplest wiring and piping. Maintenance is just minutes per month.

Operational flexibility of these 2-fan Aquatowers is outstanding. They match their performance to any climatic demand for cooling welding equipment, moulding presses, quenching operations or any process demand your plant presents. For refrigeration, these new models are nominally rated at 80, 100 and 120 tons, respectively.

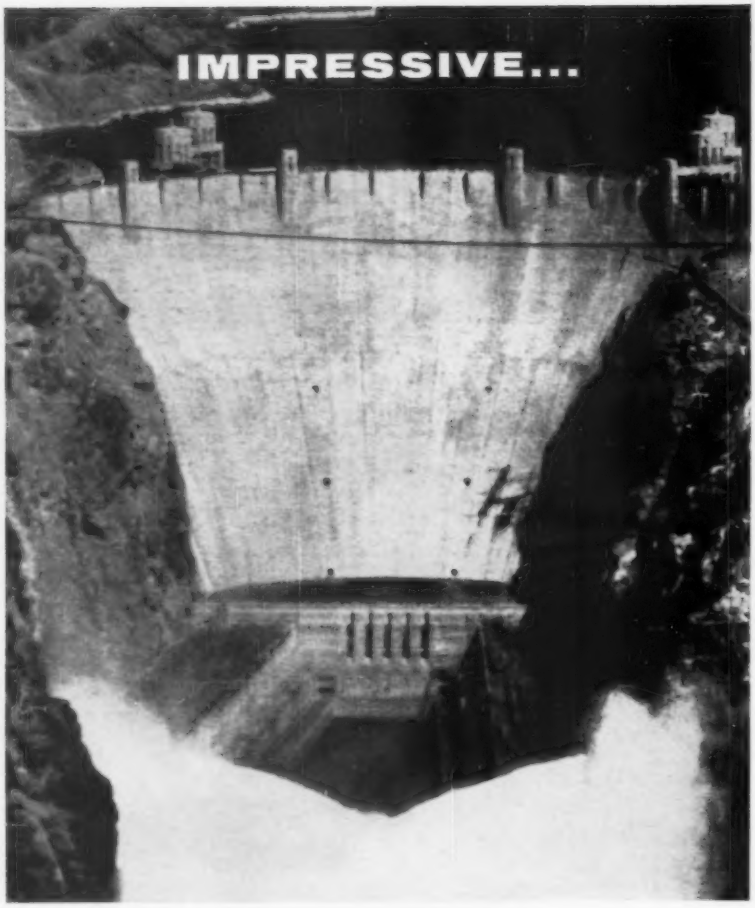
If plant operation is your responsibility, learn why these large Aquatowers really make water conservation good business for *your* plant. Call the Marley engineer in your city or write to

Aquatower is the Registered Trademark of

MARLEY **The Marley Company**

Kansas City, Missouri

For more facts circle 581 on Reply Card



DEMING PUMPS

proven performance in industry

For over 20 years the operation of Hoover Dam has compiled an impressive record of controlling floods, conserving irrigation water and supplying hydroelectric power.

For over 75 years, Deming Pumps have been noted for their *impressive performance* record in handling a wide variety of liquids for diversified industrial applications. The complete line of Deming Pumps provides more than 10,000 types, sizes and capacities to meet any industrial requirement.

Depend on Deming . . . write for complete information.

THE DEMING COMPANY 532 BROADWAY, SALEM, OHIO

Please send me a copy of your Industrial Pump Bulletin I-57-E describing pumps for every industry.

NAME _____

COMPANY _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

For more facts circle 582 on Reply Card

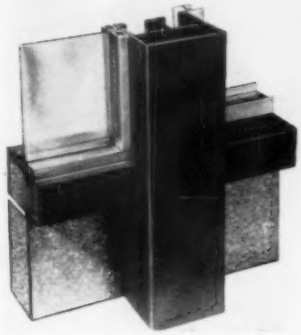
NEW PRODUCTS

(Begins on page 120)

psig can be handled in the lower capacity models. Of simple design, these single-stage centrifugals are essentially constant pressure, variable volume machines. They can be used for blower service where inlet conditions are atmospheric; for exhauster service where inlet conditions are below atmospheric pressure; or for booster service where inlet conditions are above atmospheric pressure. Details are in Bulletin 165. Clark Bros. Co.

38—CURTAIN WALL with installation advantages

Described as a new concept in porcelain enamel curtain wall design, the Erveen Curtain Wall is said to feature versatility, ease of installation and superior thermal qualities. The design consists of U-shaped structural steel mullions and struts



covered with porcelain enamel panels. Wall units consist of the porcelain enamel panels on the outside and painted galvannealed panels on the inside with fiber glass core. Both fixed windows and operating window sash are offered as integrated components. Panel sections are spring-clamped to the steel members and erection is done from within the building. Modular units, according to specifications, are factory assembled and shipped to the site in sections. According to manufacturer, this design provides exceptional insulation since it minimizes through-conductivity at mullions and struts. Flexibility of the system permits varying of panel thickness. Technical Bulletin B-11 gives data. Erveen Corp.

39—FORMING MACHINE works on sheet metal

Pullmax P-1 is a smaller version of manufacturer's shearing and forming machines and reported to handle all

"Take a tip from me—

One slip can cost more than USS Multigrip"

Men who work in slippery places . . . push heavy loads . . . or merely walk up and down stairs know what it means to have sure traction underfoot.

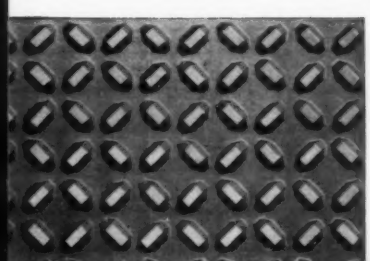
They can't wear shoes with cleats, but you can give them a floor with cleats—USS* Multigrip. Dozens of little studs provide maximum skid resistance in any direction. They are flat on top, easy to walk on—but do not catch the shoe.

Whether a landlubber or a seafarer, Multigrip assures you the same fine service. Wet or dry, Multigrip supplies safety plus.

For locations that take a heavy beating from traffic, Multigrip provides a floor that will stand up under years of constant use. Oil won't soak in and can be easily removed with regular cleaning materials. You save money by having a floor that is easy to sweep or flush clean, lasts for years with no maintenance.

On your next inspection trip, look around for danger spots—and make them safe with Multigrip*. You can get it from our local distributor.

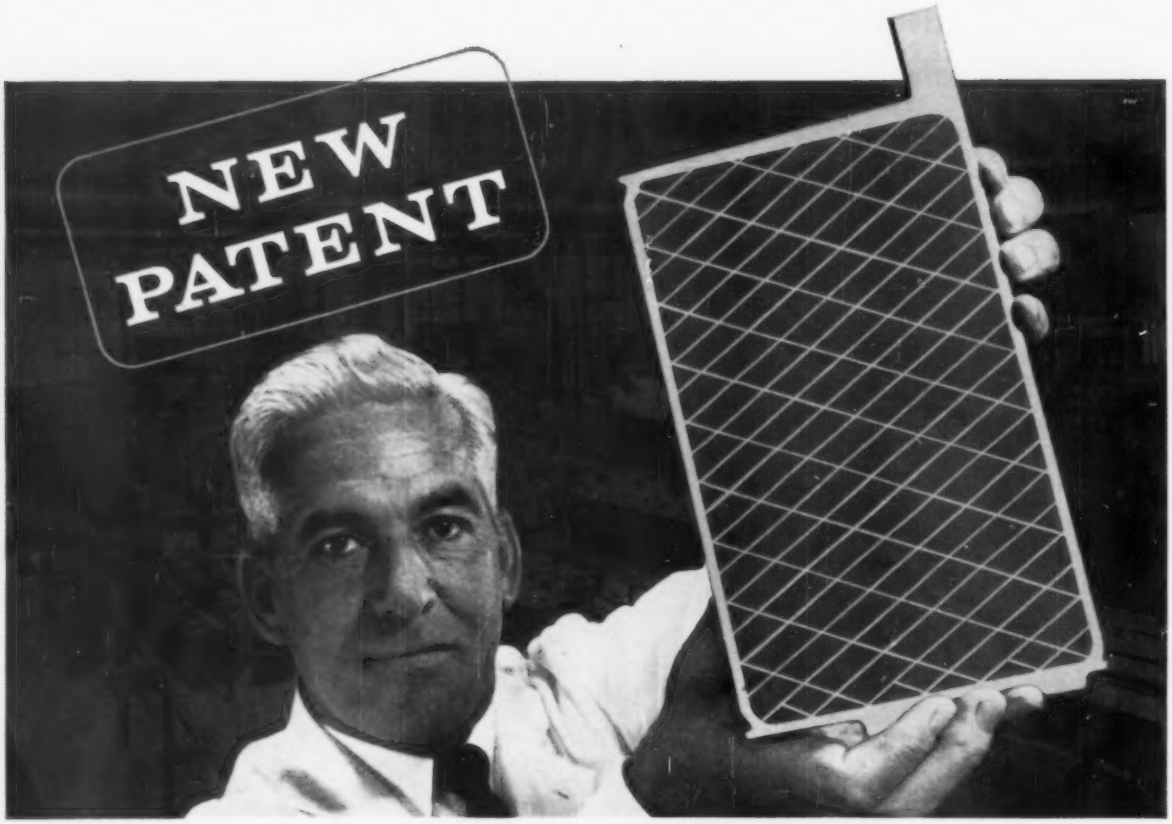
Sold by leading distributors from coast to coast.



United States Steel Corporation – Pittsburgh
Tennessee Coal & Iron – Fairfield, Alabama
Columbia-Geneva Steel – San Francisco
United States Steel Supply – Steel Service Centers
United States Steel Export Company

USS United States Steel

*TRADEMARK



The New *gould* SILCONIC Plate Lengthens Battery Life 10-25%

Two distinct improvements:

1. Gould has developed a new patented (July 1958) process for introducing Silver-Cobalt into the active materials of the positive plates of Motive Power Batteries.

The temporarily soluble silver-cobalt sulphates, when added to the active materials, migrate to all positive grid members.

The Sulphates collect on the grid members to form an insoluble oxide surface or protective sheath which is impervious to acid and oxygen attack.

2. In order to insure a homogeneous grid completely free of flaws, a carefully determined amount of arsenic is added to the regular metal. This produces a smooth flowing metal during the casting operation which results in an extremely dense and uniform grid.

By selectively adding the silver-cobalt and arsenic to the plate, Gould is able to produce the new *SILCONIC* positive plate . . . a Gould exclusive.

Gould Industrial Truck Batteries with Silconic Plates resist corrosion, hold their charge and last longer.

HOLDS CHARGE LONGER. In those applications where batteries are idle for periods of time the *SILCONIC* Plate is ideal. This Silver-Cobalt coating prevents migration of materials to the negative plate, effectively reducing self discharge within the cell.

MIGRATION OF SILVER-COBALT ATOMS. The migration of Silver-Cobalt atoms continues throughout battery life, offering continuous resistance to the corrosive attack of acid and oxygen. This continuous effect is the result of a solid state migration of the Silver-Cobalt which penetrates deeper and deeper into the grid metal during battery operation, thus prolonging the life of the *SILCONIC* Plate.

LONG-FULL SHIFT OPERATION ASSURED. Comparative tests between *SILCONIC* and conventional plates prove that the *SILCONIC* Plate maintains maximum capacity for a considerably greater portion of its service life, retards the tendency toward grid growth, assures longer full shift operation of batteries.

Write for complete data or call your local Gould representative. He's listed under "Batteries Industrial" in the yellow pages. Gould-National Batteries, Inc., Trenton 7, N. J.

More Power to you from Gould

For more facts circle 584 on Reply Card

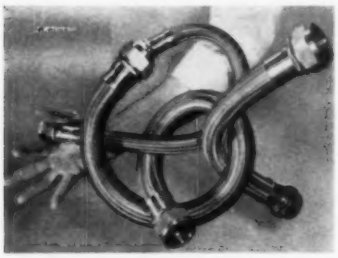
NEW PRODUCTS

(Begins on page 120)

the same operations; but it confines its work to 13-gage or lighter metal. It operates with a stationary lower tool and a reciprocating upper tool to do straight, circular, inside, irregular, slot and louver cutting, as well as beading, jogging flanging, edge-bending and dishing. American Pullmax Co.

40—FLEXIBLE HOSE stands high temperatures

For high-temperature and corrosive-handling applications, lightweight hose assemblies in the Teflon 400 series are reported to have a long life expectancy. Excellent flow characteristics are attributed to the low convolutions in the inner tube, manufactured by a process utilizing Teflon and Fiberglas tape. This hose is



available in diameters from ¾ to 2 in., and is described as extremely flexible, having a minimum bend radius of 3⅓ times the equivalent tube size. It is pointed out that when assemblies are bent below the minimum bend radius, the hose will flatten out, but return to its original shape with no evidence of damage to the inner tube or braid.

The hose has a temperature range of -65 to 400 F, it is noted, and the pressure drop will be held to a minimum. It is claimed not to weep or seep fuel through the inner tube. The hose is braided by company's Zero-Motion process designed to eliminate elongation or contraction under pressure. Titeflex, Inc.

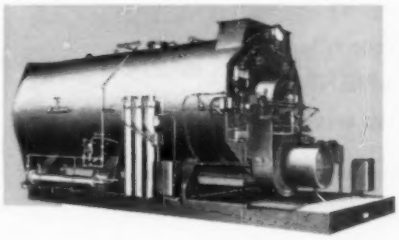
41—TRUCKS adapted to cold storage handling

To provide reliable handling with rider-walking type lift trucks in cold storage areas, this manufacturer has developed standard low temperature operation modifications for its line of Worksaver Trucks. Two types of modification are offered, one for operation in temperatures down to –10 F, and a second for prolonged truck use down to –20 F and inter-

The Flexible Steam Generator that Allows for Tomorrow's Growth

The installation of one Cyclotherm often leads to the installation of several more, because they're designed for the needs of tomorrow as well as for the needs of today.

Only Cyclotherm gives you added steam capacity in units ranging from 15 HP to 750 HP, with 18 sizes to choose from. Cyclotherms fit boiler-room space—they're up to ⅓ smaller than other Package Boilers. They need no foundation, no excavation, no costly stack. Cyclotherm Steam and Hot Water Generators come to you complete —ready to work—with one manufacturing responsibility back of the entire equipment. Cyclotherm's Cyclonic Combustion guarantees a minimum of 80% efficiency. Maintenance costs are cut by up to 50%.



And only Cyclotherm manufactures a specially designed line of Package Hot Water Generators, in capacities ranging from 670,000 BTU per hr. to 6,700,000 BTU per hr. Send the coupon below and a Cyclotherm Sales Engineer will promptly call.

Seven Cyclotherms Installed Without Interrupting Steam Supply!

Here's how H. D. Koblitz, Cleveland property management company, changed steam generators without interrupting steam supplied to 365,000 sq. ft. of plant area. On a balcony over the fire aisle, they installed 4 Cyclotherms while the old installation still operated. Then they dismantled the old boilers, putting 3 Cyclotherms in their place. A complete new installation, without one second's loss of steam!

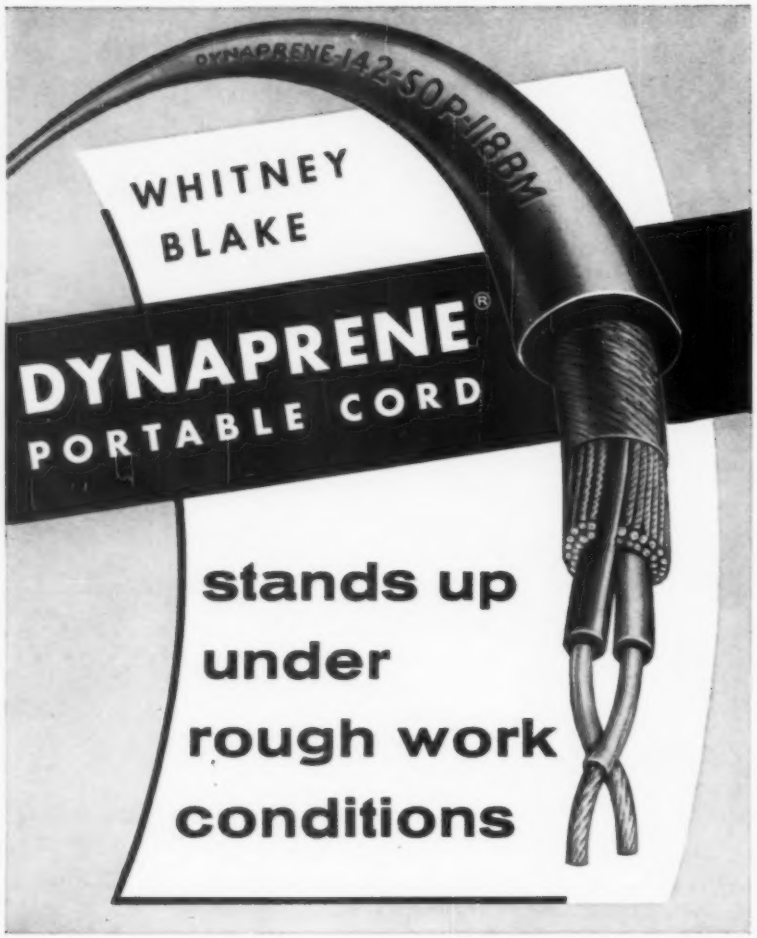
YEARS AHEAD IN STEAM & HOT WATER GENERATION
CYCLOTHERM
STEAM AND HOT WATER GENERATORS
A Division of National-U.S. Radiator Corp., 54 E. First St., Oswego, N. Y.

Clip to Your Letterhead:

54

Please send me free 4-page folder on Cyclotherm Steam and Hot Water Generators.

For more facts circle 585 on Reply Card



Where portable cord takes a beating because of rugged work conditions, WHITNEY BLAKE DYNAPRENE stands up and gives long, economical service.

DYNAPRENE has an especially tough neoprene jacket, it resists abrasion, has high flexibility and long flex life, and provides premium quality service at competitive prices.

Write TODAY for this complete catalog . . . FREE.

WB

WELL BUILT WIRES SINCE 1899

WHITNEY BLAKE COMPANY

NEW HAVEN 14, CONNECTICUT

For more facts circle 586 on Reply Card

NEW PRODUCTS

(Begins on page 120)

mittent operations as low as –40 F. These modifications can be applied to pallet stacker and low-lift units, high- and low-lift platform trucks and three types of industrial tractors. They are designed to prevent damage from condensation and loss of efficiency in operation caused by gumming and hardening of lubricants. Primary adaptations to accomplish these preventives are use of low temperature lubricants and hydraulic fluid, use of deep hard chrome plated pistons and provision of heating elements in electrical contactors on all models, and heaters in hydraulic valve compartment of high lifts. The Yale & Towne Mfg. Co.

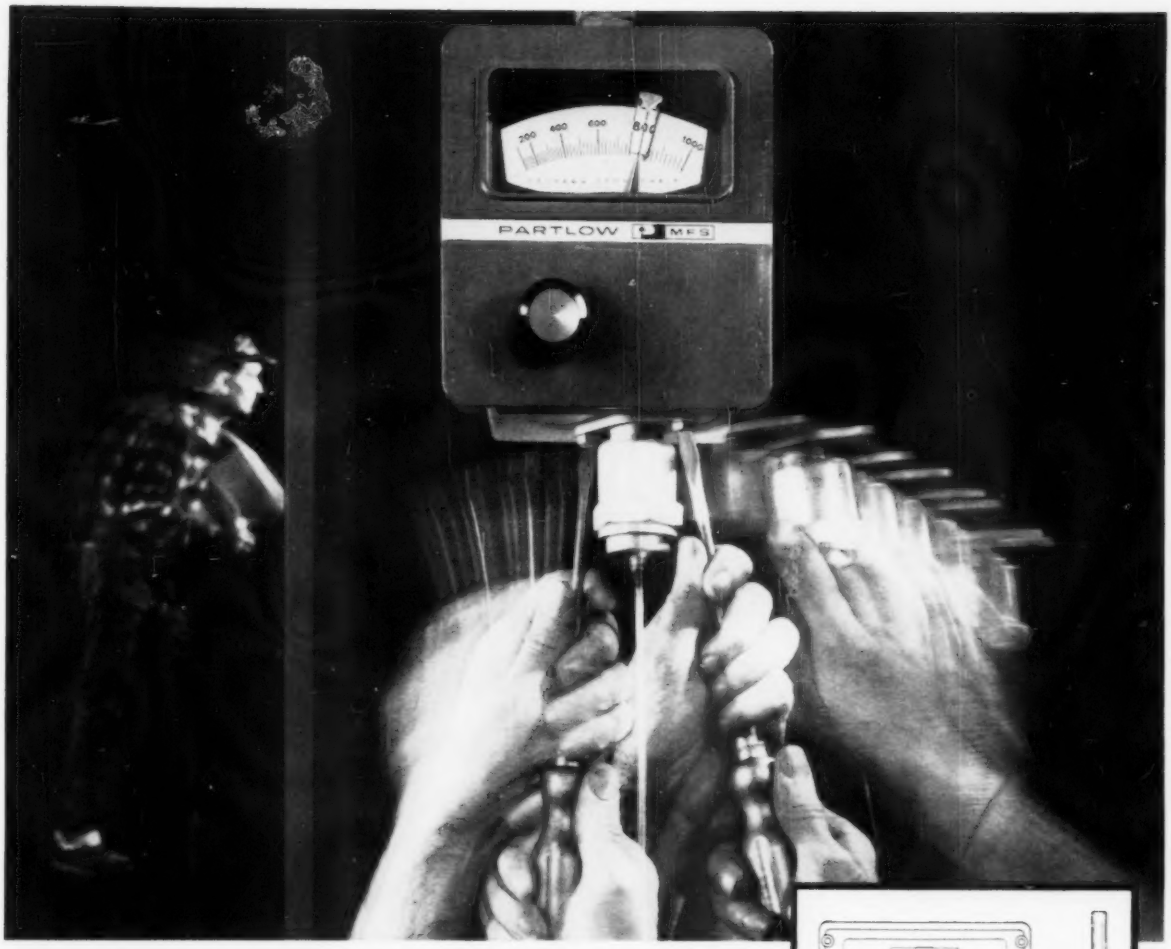
42—MACHINE TOOL increases surface grinder capacity

Roto-Grind will double the capacity of a 6-by-18 in. surface grinder, says manufacturer; it will grind the surface of a 12-in. diam plate flat and

parallel to a tolerance of fifty millionths. This motorized rotary table is designed to fit on any surface grinder in either horizontal or vertical positions—the vertical position permits ID and OD grinding on a surface grinder. Roto-Grind can be used in conjunction with jig grinding for large rings or off-set holes. The motor can be disengaged. M-M Tool Mfg. Co.

43—LOW COST SEPARATOR for steam, air, gas

Improved Type T Separator utilizes centrifugal force to separate moisture and oil entrained in vapor flow. As illustrated, the steam, air or gas is directed through an annular passage which increases its speed to produce a maximum of centrifugal force. Entrained matter, which then clings to the outer wall drains to the bot-



The Temperature Control Designed for Fast

"DO IT YOURSELF" MAINTENANCE

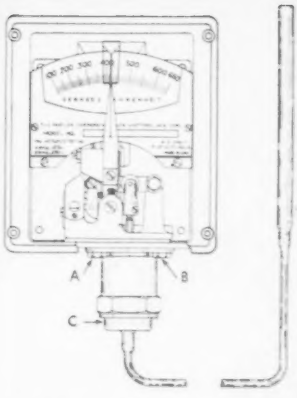
Right on the Job!

Rugged simplicity of design—along with the direct, positive power of mercury-actuation — combine to give Partlow maintenance and performance advantages no other type of temperature control can hope to equal.

Simplicity in the Partlow, for one thing, means that the control element can be changed *at the job site* in a matter of minutes with no other tool than a screwdriver . . . "Down time" is cut to an absolute minimum!

And simplicity in the Partlow also means the complete elimination of fussy electronic gadgets, delicate levers, hairsprings and other accessories that have a tendency to break down at the first trace of jar or jostle. Partlow controls are famous for their unfailingly accurate performance even under the most adverse operating conditions.

If you use or manufacture process equipment within the -30° to 1100° F. range, there's a Partlow pneumatic, electric or self-contained gas control (recording, indicating or non-indicating), to fit your application *precisely*. For details, write The Partlow Corp., New Hartford, New York. Dept. PE-1258.



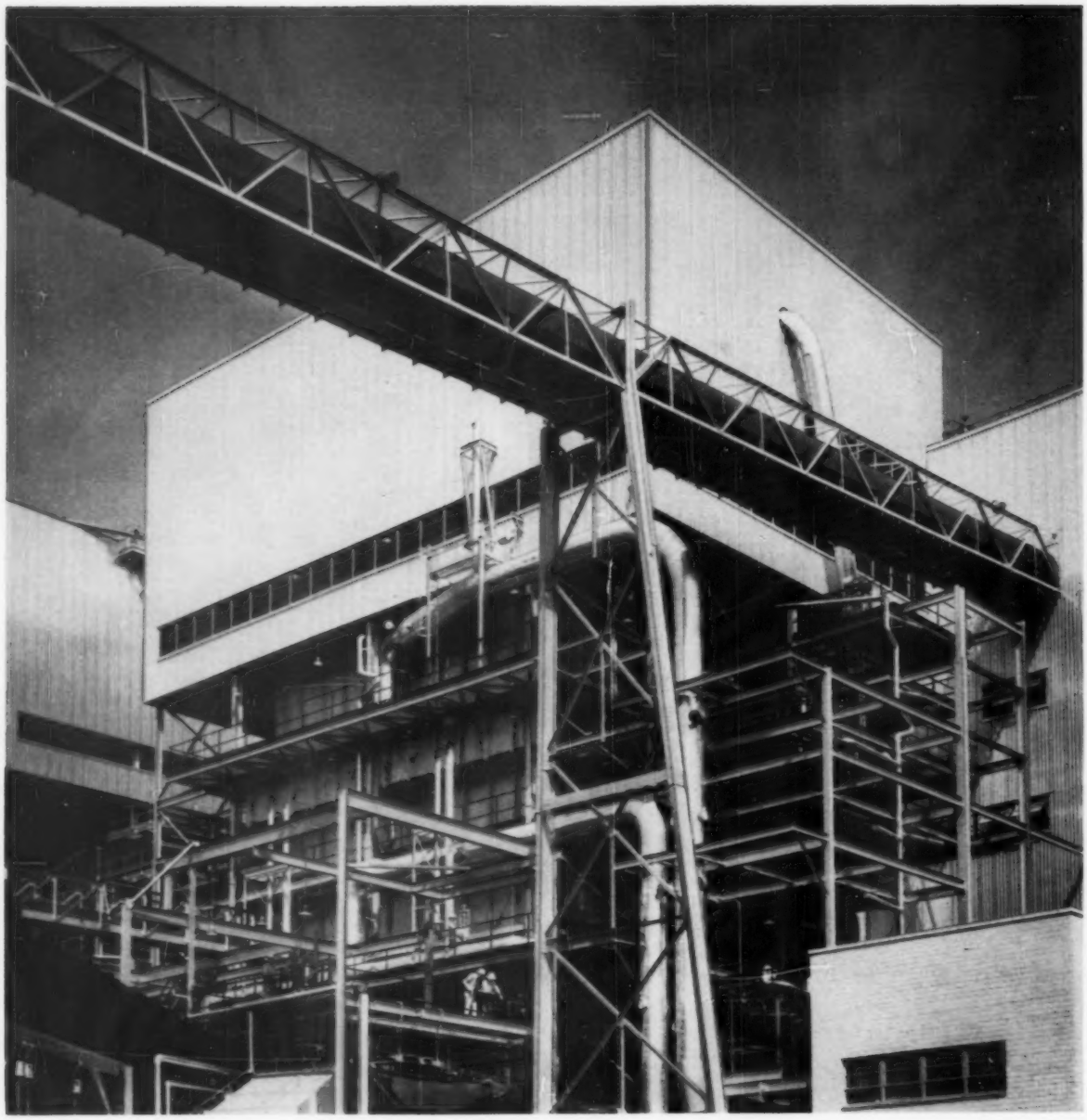
Diagrammatic view of the new MFS reveals "quick-change" feature common to all Partlow controls. In case of damage, merely unscrew at points (A) and (B), and remote element (C) from case. Reverse this process, and your Partlow is ready to resume operation.

You can pay more but you can't buy better than

PARTLOW

TEMPERATURE CONTROLS

For more facts circle 587 on Reply Card



Power Company buys aluminum's long-range economy

No maintenance or painting makes Robertson Q-Panels choice for West Penn Power's Armstrong Station

West Penn Power used Alcoa® Aluminum extensively throughout its new Armstrong Station. Because, with aluminum, *first costs are last costs.* There's no costly painting or maintenance . . . no need to worry about corrosion damage. Aluminum stays on the job year after year, defying fumes, grit and the worst kinds of weather.

Robertson Q-Panels, prefabricated and ready for on-site erection, were West Penn's choice. Dry construction and light weight sped erection and permitted earlier occupancy. Framing and foundation requirements were reduced.

Industrial skylines all over America are sprouting better buildings at lower cost because of Alcoa's pioneering achievements in aluminum. Call your nearest Alcoa sales office for complete data and technical help. Or write Aluminum Company of America, 858-M Alcoa Building, Pittsburgh 19, Pa.

For more facts circle 588 on Reply Card

Building: Armstrong Station, West Penn Power Company
Consulting Engineer and General Contractor: Sanderson & Porter, New York, N. Y.
Panel Fabricator and Erector: H. H. Robertson Company, Pittsburgh, Pa.

ALCOA THEATRE, Fine Entertainment, Alternate Monday Evenings

ALCOA ALUMINUM

Your Guide to the Best in Aluminum Value

NEW PRODUCTS

(Begins on page 120)

tom of the separator and to an automatic trap. The entrance to the outlet chamber has been enlarged to eliminate re-entrainment problems. The force of flow and simple bottom collecting section make this a self-cleaning unit, and the straight through pipe connections permit easy installation, manufacturer points out. These separators come with screwed connections through 3-in. and 125-lb ASA flanges through 8-in. size. Wright-Austin Co.

It's easy to obtain product data with the postage-free Reader Service Cards provided on pages 161-162. Use them for information on advertised products, too. Just circle the key number appearing at bottom of the ad.

44—SAFETY GRATING with non-skid surface

Made of solid steel bars and light weight assembly, Firm-Grip features an all directional serrated surface

said to afford effective non-skid yet comfortable treading. It is claimed ideal for installations where employees must stand on one location. Bustin Steel Products, Inc.

45—GEAR COUPLING has one-piece nylon sleeve

The Nyflex, a non-lubricated, flangeless, flexible gear coupling, has a one-piece nylon sleeve, weighs only 3½ lb and is reported capable of operating over a wide temperature range at speeds to 5000 rpm. It comes in 10 bore sizes from 7/16 to 1⅝ in, with prices reportedly half those of comparable steel couplings. A feature announced is ability to take more misalignment than many gear couplings—nearly 5 deg. According to company, the unit absorbs both

angular and parallel misalignment and end float with minimum backlash, and has been run for more than 800 hr at total misalignment with no signs of wear. Nyflex is designed for use on portable motor generating sets, motor pump sets, as a replacement for chain-type couplings and for many applications where a size 1½ standard coupling is now used. Sier-Bath Gear & Pump Co., Inc.

46—INSTRUMENT HOUSINGS are corrosion resistant

Reinforced with fiber glass, these instrument housings are described as light, strong and corrosion-proof. The housings are claimed ideal for use in the chemical and allied industries where corrosion is a problem. Warminster Fiberglass Co.

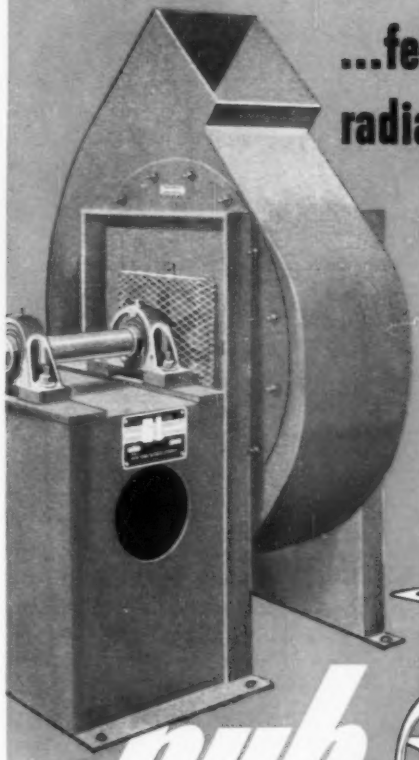
(More New Products on page 180)

For BIG performance...

The BIG change is in ALL NEW

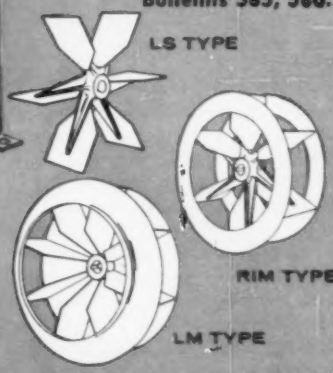
G.I. FANS

...featuring flat radial blade wheels



Workhorse durability plus precision machine efficiency equals BIG performance. All new G.I. Fans incorporate advanced aerodynamic techniques that combine improved efficiency with all the advantages of the flat radial blade design. Three wheel types are offered to provide rugged performance for virtually any type application.

Write for details in Bulletins 585, 586.



nyb

THE NEW YORK BLOWER COMPANY

Sales Offices: 3163 S. Shields Avenue • Chicago 16

For more facts circle 589 on Reply Card

Mr. Theodore R. McClure,
Asst. Chief Chemist at Sun Oil Company's Marcus Hook, Pa. Testing Lab, tells you . . .

"Here's how we keep our drainline free from costly, patchwork mending"

"Until we installed *glass* drain pipes, acid drippings were beginning to menace our personnel and equipment.

"Maintenance men were in our building regularly, recaulking weakened joints.

"Then three years ago we installed corrosion-resistant PYREX® pipe. Since then there have been absolutely *no* leaks, and maintenance men have *not once* been called in for pipe mending.

"Installation of this 250-foot system, including ripping out the old system, was a quick job—with a two-man crew working about 60 hours. That's only *about ⅓ the time* required for installation of other types of pipe.

"Working with *glass* made it easy. Only a few tools were required. Cutting, beading, and installation seldom took more than 15 minutes. And the light weight of glass made it easy to handle, required fewer brackets to hold it up.

"Now our *glass* drainline is carrying a continuous flow of highly corrosive acids and alkalis—from 8:00 A.M. to 5:00 P.M. daily—absolutely free from costly, patchwork mending."

Find out more about PYREX pipe for *your* drainline. If *you* handle corrosives, you'll never know how little you can spend for maintenance and installation until you install PYREX pipe. Write for Bulletin PE-30 for all the details.

Corning means research in Glass

CORNING GLASS WORKS
10-12 Crystal Street, Corning, N.Y.

For more facts circle 590 on Reply Card

NEW BOOKS

for the plant engineer

How To Get a P.E. License

HOW TO BECOME A PROFESSIONAL ENGINEER by John Constance. Size 5⅜ by 8 in.; illustrated; cloth bound. Published by McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N. Y. Price $5.50.

ENGINEERS INTERESTED in obtaining a professional engineer's license will find a lot of helpful information to prepare them for their state's examination.

The seven basic requirements for licensure are listed and clarified. Various state registration laws are also summarized along with examples of how examining boards evaluate the experience of the candidate.

Information on how to prepare an application, pointers on selecting the qualifying experience and writing it up; and how to prepare for written and oral examinations are also included.

The book is applicable in all states, showing what all boards aim for. There is a chapter on the engineer's seal and its use, and extensive appendixes list names and addresses of state board secretaries, accredited schools and recommended texts.

Process Control

AUTOMATIC PROCESS CONTROL by Donald P. Eckman. Size 9 by 6 in. approx; 368 pp including index; illustrated; cloth bound. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N.Y. Price $9.00.

ENGINEERS who want to get an "inside view" of automatic control and the reasoning behind it should find this book profitable. However, it should be pointed out that the treatment includes information which is quite technical. For this reason, the reader should have an understanding of thermodynamics, fluid mechanics, calculus, differential equations and mechanics.

Analysis techniques are used extensively in this book and enough detail is presented permitting closer inspection of the more difficult problems in automatic process control.

Among the principal topics treated in the ten chapters of the book are: process characteristics; closed loop in automatic control; controlling elements; process instrumentation, and stability analysis.

Convenient Prototype Trial with GR Variac®

MOTOR SPEED CONTROLS

Optimum mechanical performance is best determined by testing a prototype design at a variety of possible operating conditions. Features inherent in Variac Motor Speed Controls ideally suit them to experimentation of this kind. Their great use in this type of work is attributable, in large part, to a very wide speed range, constant output torque, and the ability to start and stop heavy loads quickly.

These Speed Controls provide adjustable speed operation of d-c motors from a-c lines, combining the convenience of a-c power with the excellent starting characteristics and good regulation of d-c shunt- and compound-wound motors.

Variac Motor Speed Controls are available in several horsepower ratings: one fifteenth and less, one twelfth to one sixth, one quarter to one third, one half to three quarters with choice of compact unit construction for installation at control point or stripped-down design for use in original equipment. Start, stop, and reverse controls are included, as well as overload protection. Rugged selenium rectifiers are used, and make possible quick starting, very low maintenance, and low price.

There are many models from which to choose, and prices start as low as $72.00 — quantity discounts are available.

For information, write for our Variac Motor Speed Control Bulletin.

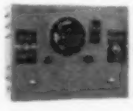
G-R one-third horsepower Variac Motor Speed Control drives rollers of a readout prototype for a Burroughs high-speed computer. The effects of roller shape and roller material on acceleration of paper samples is readily determined by noting paper slippage at different starting speeds set by the Speed Control. Optimum mechanical design consistent with maximum speed is thus arrived at in minimum time.

Versatile Variac Motor Speed Controls are used in a wide variety of applications. They are rugged enough to control high-speed grinders and drills, lathes, milling machines and punch presses, yet gentle enough to control centrifuges, jewelers lathes, and similar light equipment.

Photo Courtesy The Burroughs Corporation Research Center at Paoli, Penna

1/15 hp and less
Type 1701-AK
$85

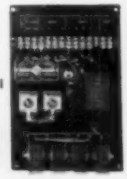
1/12 to 1/6 hp
Type 1703-A
$105



1/4 and 1/3 hp
Type 1700-B
$180

1/2 and 3/4 hp
Type 1702-A
$255

Type 1701-AKW
Stripped-Down Model
$72



GENERAL RADIO Company

275 Massachusetts Avenue, Cambridge 39, Mass., U. S. A.

GR 2-Year Warranty on every Product

NEW YORK AREA: Tel. N. Y. WOrth 4-2722, N. J. WHitney 3-3140 **CHICAGO:** Tel. Village 8-9400
PHILADELPHIA: Tel. HAncock 4-7419 **WASHINGTON, D. C.:** Tel. JUniper 5-1088
SAN FRANCISCO: Tel. WHitecliff 8-8233 **LOS ANGELES 38:** Tel. HOllywood 9-6201
In CANADA, TORONTO: Tel. CHerry 6-2171

WE SELL DIRECT. Our District Sales Offices are staffed by engineers especially trained to help you in the selection of instruments and measuring systems best suited to your needs. We welcome your inquiries — will help solve your problems.

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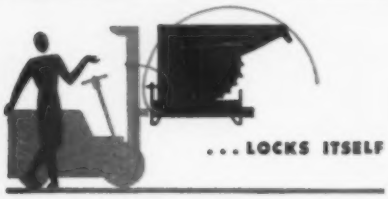


This hopper and your truck can cut handling costs 50%

It's a self-dumping hopper made for fast, efficient handling of wet or dry, hot or cold bulk materials, such as:

Scrap Metal . . . Cinders
Cullet . . . Hot Forgings
Punch Press Parts
Soybean Meal . . . Pickles

Hundreds of industries use thousands of them. Pick-up is swift and simple. Forks or platform of any standard lift truck slide easily into hopper underframe. Truck operator picks up loaded hopper . . . transports it to its destination . . . trips the latch . . . and the Roura does the rest . . . automatically.

They're strong . . . husky . . . made of 3/16" steel plate with continuous arc-welded seams. Also available in stainless steel or galvanized. Made in five sizes, ½ to 2 yard capacities, with live skids or a choice of wheels.

Standard models are available for immediate shipment from stock.

ROURA
Self-Dumping
HOPPER

WANT MORE DETAILS on how you can save money with Roura? Just clip this coupon... attach it to your letterhead . . . sign your name . . . and mail to

ROURA IRON WORKS, INC.
1413 Woodland Ave., Detroit 11, Michigan

For more facts circle 592 on Reply Card

Industrial Air Tube System

(Continued from page 98)

prevent carriers from entering a clogged outgoing tube. Vacuum switches close the lines down until the tubes are cleared. See Fig. 5. Each switch responding to a drop in outgoing line pressure, operates a limit switch which disconnects the outgoing line. All carriers addressed to stations on the shut-down line automatically continue on in the main line and end up in the mail room, where clerks will see that contents are distributed.

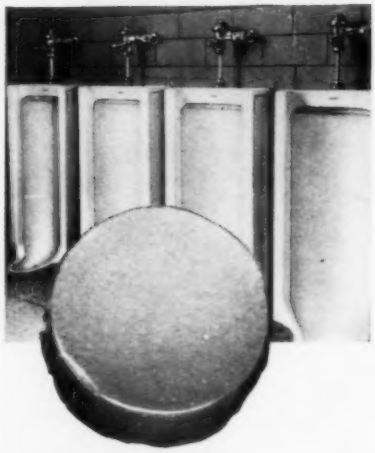
How Tube Traffic Is Regulated

In addition to the traffic regulation performed in the monitor, a supplementary arrangement in each outgoing tube guards against a light weight carrier overtaking a heavier one in transit. About half way out in each line, a 40-ft length of 5-in. diameter pipe bypasses the main tube. A solenoid valve separates this "line spacer" from the main line. A Micro Switch, in the main line at the far junction of the bypass, is wired to a timer which is set to hold the solenoid valve open for one half the interval of time at which two consecutive carriers enter the tube at the monitor.

As a carrier leaves the line spacer section, it trips the Micro Switch. Any carrier which is in the line spacer when the valve opens—that is, if it is less than 40 ft behind another carrier—will come to a stop because the air will move through the path of least resistance, the bypass. When the valve closes again, air flow returns to normal, and the carrier resumes its travel.

In addition to reducing the number of messengers needed, this system also contributes to more efficient operations. First, timely arrival of communication assures prompt action when it is required. Direct movement of communication between departments shortens travel time; this is important because serious delay can result from excessive time consumed for paper moving between departments as it is created, steady flow is possible, permitting better use of personnel and equipment. **End**

NEW HUNTINGTON ODOR BAR BLOCKETTES



DESTROY ODORS CHEMICALLY

Guaranteed more effective than perfumed blockettes

Here is a new way to neutralize smelly, organic matter in urinals. When moisture hits the blockette, an anti-bacterial chemical vapor is released that deodorizes and sanitizes by an immediate, almost total chemical destruction of bacteria. Tests show 94.4% bacterial count reduction. You must be satisfied or your money will be refunded.

See the Man Behind the Drum . . . your Huntington representative for full details. Ask him for a sample of Odor Bar Blockettes.

HUNTINGTON LABORATORIES
INCORPORATED
Huntington, Indiana • Philadelphia 35 • Toronto 2

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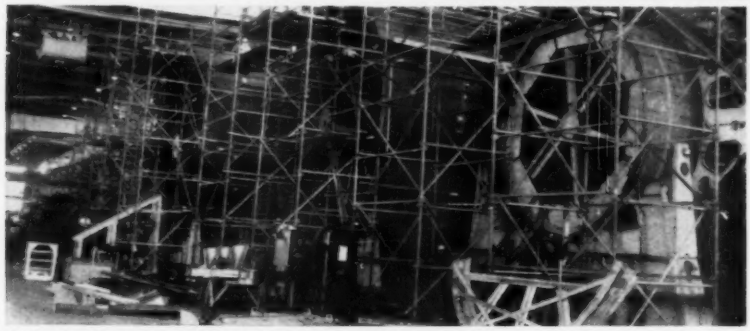
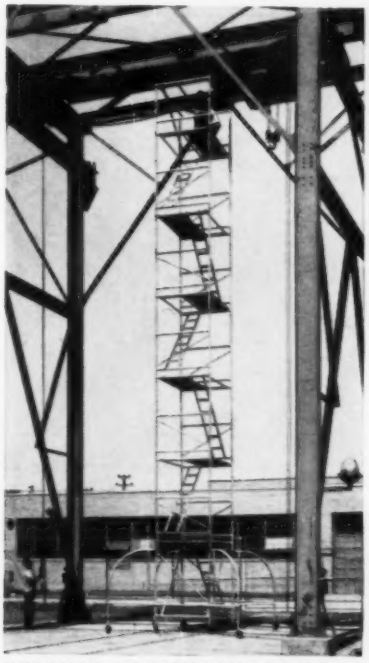
Safe Maintenance Methods

A picture report on efficient ways to scaffold . . . by The Patent Scaffolding Co., Inc.



INDUSTRIAL SCAFFOLDING—During construction of hull sections for new atom subs at the Mare Island Naval Shipyard, "TubeLox"® Scaffolding helps workmen get safely around the curved shapes. Made with only four basic parts, this scaffolding is erected rapidly to conform to almost any shape, size or contour and on any terrain, if exterior work is considered. Adjustable couplers and a variety of tube lengths permit unlimited scaffold placement.

PAINTER'S HELPER—"Trouble Saver"® Sectional Rolling Scaffold with 12″-wide Featherweight Stages gives Gombert Bros., an easily moved, safe painting scaffold at the North Belmore (N.Y.) Elementary School.



ROLLING ALUMINUM TOWER—To repair a crane at the Public Service Electric & Gas Co., Bergen County Switching Station, N.J., a Model B Aluminum Sectional Rolling Scaffold is used. Four outrigger supports increase base area to 10′x10′ for greater stability at extreme heights. Five 6′-high sections atop the 6′9½″-high base bring workmen safely up 36′-9½″ under the crane mechanism.

REFINERY WORK—At the Tidewater Oil Co., Wilmington, Del., 3500 "Trouble Saver" Scaffolding frames and 15 miles of "TubeLox" Scaffolding are used by C. F. Braun & Co., contractor, to get strong, level, safety-assured working platforms on refinery's varied structures.

LIGHT-DUTY SCAFFOLDS—Designed for light-duty work, "Gold Medal" Junior Safety Swinging Scaffolds provide extra-safe, quick working levels on tanks, buildings and other structures. Suspended from above by 5/16″ galvanized steel cable, these scaffolds have 28″-wide plattorms with double, steel-reinforced side-rails; hinged toe-boards; and 16′, 18′, 20′, 22′, 24′-lengths.

"GOLD MEDAL"®— Safety Platform Step Ladders. Broad working platforms. Top quality construction. U.L. approved. Sizes: (total height) 5′ to 20′.

NEW STEP LADDER—Aluminum Safety Platform Step Ladder with nonslip safety platform and steps. Strong, lightweight. Heights 5′ to 14′. Other aluminum models include: Extension Ladders, 16′ to 40′; Heavy Duty Step Ladders, 4′ to 14′; Platform Step Ladders, 5′ to 14′; and Single Ladders, 8′ to 20′.

Write for free copy of "Controlling Costs", Bulletin G205R. Also, see the Yellow pages of your 'phone directory for the nearest Patent Scaffolding Co. office or representative that *sells* or *rents* "Gold Medal" Scaffolds.

FOR GREATER SAFETY...EFFICIENCY...ECONOMY

THE PATENT SCAFFOLDING CO., Inc.

38-21 12th Street Dept. P.E. Long Island City 1, N.Y.

For more facts circle 594 on Reply Card

SURVEY REPORTS SKIN DISEASE IS INDUSTRY'S NO. 1 HYGIENE PROBLEM

Here's What To Do About It In Your Plant

Recently, 2,177 major plants were surveyed by a market analyst to discover their No. 1 skin hygiene problem. The overwhelming majority of replies said: SKIN DISEASE.

The reasons for this answer:
—skin disease means costly medical treatment
—skin disease means prolonged absenteeism
—skin disease means worker dissatisfaction and compensation claims

What can you do in your plant to fight this problem? Call in an SBS skin cleanser representative. Most skin disease troubles can be traced to improper cleaning or use of the wrong cleaners. Your SBS representative is the man most completely equipped to study the situation and offer measures to improve it. He'll check all the conditions in your plant and recommend . . . not just a soap, but a *planned corrective skin hygiene program* for safe skin cleansing. Because Sugar Beet Products produces a *complete range of cleansers*, the SBS man can recommend the *exact ones* for your needs. Many famous firms are protected by SBS skin cleanser programs. Why not write us today? Dept. 58-L3.

the washword of industry

SBS sugar beet products co.

SAGINAW, MICH. • Los Angeles, Calif. • Newark, N.J
CANADA: Chemical By-Products, Ltd., Toronto, Ontario

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Teflon Packings and Seals

(Continued from page 109)

which allows O rings to slip rather than grip the groove.

Backup rings have generally been made in double spirals and have extended the range of O rings from the 1000 psi range to approximately 3000 psi, and have operated satisfactorily at 275 F continuously. In most cases, use of Teflon backup rings has resulted in longer life of the O rings and decreased leakage.

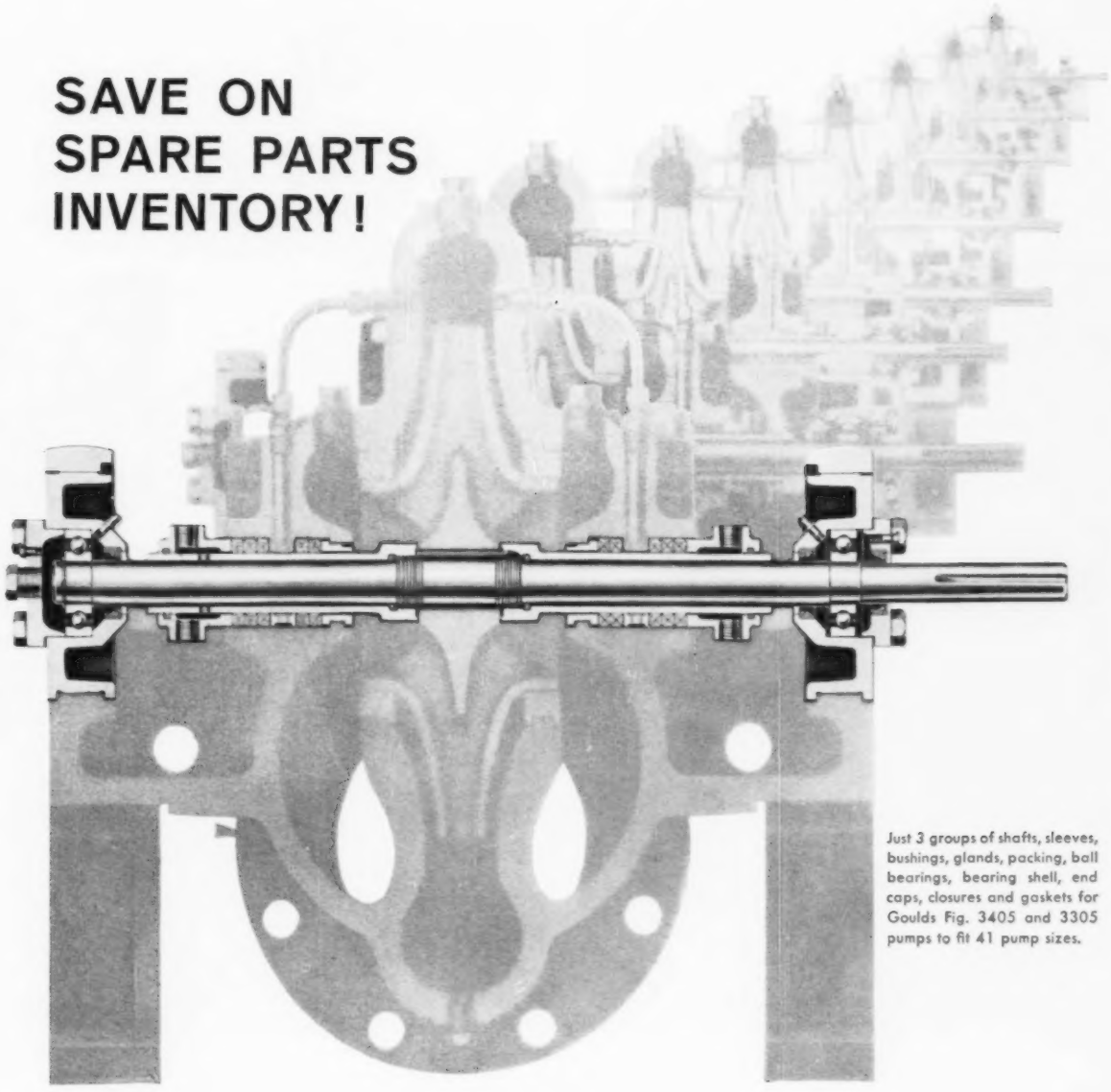
Oil seals of the spring-loaded type have emerged in many ramifications from use of all Teflon sealing lips for relatively low shaft speeds to high speed shaft service in which thin Teflon shields have been placed over the usual elastomeric sealing lips. See Fig. 7.

"Why the face? You haven't even seen the bill for it yet . . ."

Some moderate commercial success has been obtained with this type unit and extensive laboratory tests have shown excellent results on Teflon shielded seals which operated in hydraulic fluid at 20 psi and 300 F with shaft speeds in the range of 1800 linear feet per minute. Leakage rates on the above tests have regularly been under four grams per 100 hours on a 1000 hour test in face of deliberately imposed shaft runout and seal eccentricity.

The Teflon has provided a low friction contact which results in lower surface temperatures being created on the resilient rubber members and, as a consequence, a longer seal life. **End**

SAVE ON SPARE PARTS INVENTORY!



Just 3 groups of shafts, sleeves, bushings, glands, packing, ball bearings, bearing shell, end caps, closures and gaskets for Goulds Fig. 3405 and 3305 pumps to fit 41 pump sizes.

See how just 3 groups of parts fit 41 pump sizes!

High degree of interchangeability of parts on Goulds Fig. 3405 single-stage and Fig. 3305 two-stage Centrifugal Pumps helps you save four ways:

1. You cut down your spare parts inventory.
2. You can make changes in the field to meet new requirements.
3. Off-the-shelf delivery of standardized parts.
4. You can get lower initial cost, due to standardization of parts during manufacture.

Just three shaft and rotating parts assemblies provide for 41 sizes of these two popular pumps. You cut spare parts inventories *up to 91%*, save the cost of unnecessary overstocking.

Up to 82 pump combinations are possible—considering right- and left-hand rotation—and rotation can be changed in the field due to unique sleeve locking device (patented). Mounting dimensions and motor drive bedplates are standardized to facilitate changing without the additional expense of drilling and tapping.

And . . . you get all of this at low cost! Standard parts make manufacture less costly. Goulds passes on the savings to you.

Find out how this maximum interchangeability can save you money by sending for Bulletins 721.6 and 722.6, or ask your nearest Goulds representative.

GOULDS PUMPS, INC., Dept. PE-128, Seneca Falls, N. Y.

GOULDS

PUMPS FOR INDUSTRY

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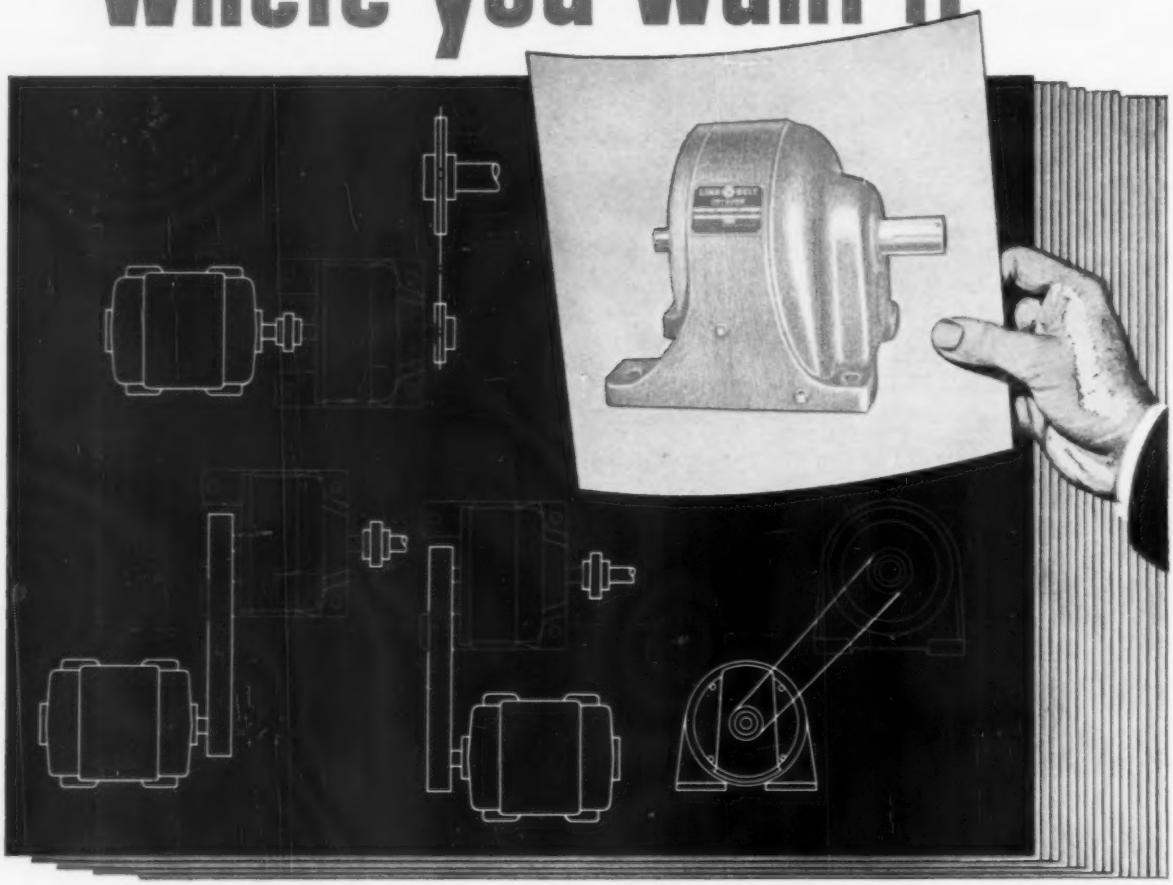
Here's a SPEED REDUCER that lets you

mount the motor where you want it



Versatile **LINK-BELT** *In-Line helical gear drives give wide latitude in drive arrangement*

Make the most of mounting space with quiet, cool-running, oil-tight Link-Belt In-Line helical gear drives. No need to direct-connect the motor. Where layout requirements so dictate—or to achieve even higher reduction at low cost—a chain or gear drive can be used in between. Location of input and output shafts on same planes make installation easy, saves space.

Consists of a streamlined housing with double, triple or quadruple reductions up to 206 hp. Call your authorized Link-Belt stock-carrying distributor or nearby Link-Belt office. Ask for Book 2651.

BOOK 2651

LINK-BELT

SPEED REDUCERS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 14,805

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BULLETINS

(Begins on page 23)

MECHANICAL POWER TRANSMISSION

148 Speed Reducers—Book 2618, 24 pp, describes a new line of shaft-mounted speed reducers. Contains engineering and selection information on: single reduction drives in six sizes, with nominal ratios of 5 to 1 and capacities to 50 hp; and double reduction drives in seven sizes, nominal ratios of 15 to 1, up to 40 hp. Includes dimensional data, and illustrates drive assembly arrangements, V-belt positions, etc. Link-Belt Co.

149 Adjustable Speed Drives—Bulletin GEA-6234B, 8 pp, describes general-purpose Thymotrol adjustable speed drives, 1 hp half-wave and 1 to 4 hp full wave. Explains standard and optional features, electrical and performance characteristics, application advantages, and construction features. Photos, cutaway drawings, line drawings included. General Electric Co.

150 Heavy Duty V-Belts—Design and selection of heavy duty V-belts is discussed in 16-pp Bulletin DH-301, a condensed catalog. Drive selection tables are provided, as well as installation suggestions. Construction features of company's V-belts are covered in detail. The Gates Rubber Co.

151 V-Belt Drives—How to get longer life from V-belt drives is discussed in 12-pp illustrated Catalog IP-1577. Tells how to select and install V-belts, how to detect V-belt trouble, diagnose belt failures, correct drive troubles. Tips on V-belt maintenance given. B. F. Goodrich Industrial Products Co.

152 Spherical Roller Bearings—Design and application of spherical roller bearings is covered in 50-pp Catalog 258. Complete dimension tables, load ratings expressed as basic dynamic capacity, and line graphs showing modifying speed and life factors are included, as well as dimensional diagrams, engineering data, and information on applications. The Torrington Co.

VALVES, FITTINGS

154 Valve Ordering Data—In these condensed catalog sections, 12 pp, are presented bronze, globe, angle, check, gate, radiator and specialty valves. Material is so listed that you can readily find pressure ratings, recommended uses, features, and roughing-in dimension for each valve in a wide range of sizes. Pages are arranged with low and standard pressure valves of each type together. Ohio Brass Co.

155 Servo Valves—Catalog 220, 6 pp, describes flow-control servo valves available at maximum rated flows to 10 gpm at 1000 psi valve drop with operating supply pressures from 500 to 4500 psi. Detailed information is accompanied by curves on normal flow gain tolerance, load flow-pressure characteristics, typical frequency response and tolerance and nominal coil characteristics. A glossary of servo valve terms is included. Moog Valve Co., Inc.

156 Control Valves—Twelve-pp Bulletin LB-3 gives details on construction and operating characteristics of company's Series LB control valve. Various design features are described, operation of valve positioner shown in detail, and advantages of tight-shut-off in a control valve explained. Complete specifications are included. Conoflow Corp.

157 Forged Steel Unions—Detailed information on construction of company's full line of forged steel unions and union fittings is contained in this loose-leaf catalog. Contains detailed specifications on Petro, Handlebar, Hydro, Mark and Orifice unions, check valves and forged steel fittings, ranging from 2,000 lb through 6000 lb CWP. Clayton Mark & Co.

158 Manifold System—Production, space and cost benefits in continuous distribution of industrial gases by custom-built manifold installations are described in this 28-pp bulletin. Duplex, simplex and portable manifold distribution systems piping oxygen, hydrogen, nitrogen, helium, argon, acetylene and other gases for welding, cutting, heating, flame hardening, flame blasting are detailed. National Cylinder Gas, Div. Chemetron Corp.

Practical Pointers on Putting Paint to Work

159 Protective Coating—A heavy-bodied, textured decorative coating for exterior masonry walls above grade is described in Bulletin BP 3063. Lists product's water-repellent, elasticity, durability and bonding properties. Color chips illustrate colors offered and indicate kind of texture obtained. Application, specification and coverage data are included. L. Sonneborn Sons, Inc.

160 Functional Color Kit—Selection of paint colors to promote efficiency, safety and morale in industrial plants is among the subjects covered in this Functional Color Kit. Color specifications for mechanical areas, drafting rooms, wash rooms, cafeterias, etc., are illustrated and explained, and a set of 36 color chips of recommended paint colors, identified by number and showing reflectance percentage of each, are included. Colorizer Associates.

161 Color Code System—Materials for revising your old color coding system—or for designing a new one—are featured in this color coding kit. Key item is a color code chart, in which spaces are provided to write in names of items being identified, along with spaces for the identifying color code. Actual paint color samples are supplied. Crown Industrial Products Co.

162 For Paint Spraying—Catalog CH-100, 24 pp, describes company's air compressors and paint spraying equipment. Detailed information on eight compressor series, two series of spray guns, and accessory equipment is included. Applications are illustrated along with construction specifications and model information. Campbell-Hausfeld Co.

Reader Service Cards for ordering bulletins are on pages 161-162. Be sure to include your name, job title, and company, even if you want bulletins mailed to your home address.

BARS, TUBING

164 Steel Bar Chart—This wall chart lists AISI grades of cold finished steel bars—241 in all. Provides chemical analyses and machinability ratings. In addition to specialty steels, chart covers screw machine steels, resulfurized carbon steels, open hearth steels and alloy steels. Also included is table of weights. LaSalle Steel Co.

165 Cold-Drawn Tubing—Twelve-pp Bulletin 41 is a selection and application guide for small-diameter tubing. Gives form (seamless or Weldrawn), characteristics and applications of standard and special materials cold-drawn into small tubing. Tubing materials are grouped as carbon, alloy and stainless steels; nickel alloys; copper-base alloys; and reactive metals. Superior Tube Co.

INSTRUMENTS, CONTROLS

166 Industrial Gages—This 40-pp catalog contains detailed descriptions, specifications, and applications for over 250 different gage models, including pressure, vacuum, compound, pneumatic and electric transmitter, receiver, and test gages; chemical protectors, and various gage accessories. Basic design features are detailed on exploded view showing typical gage. A listing of available models, is also included, as well as weights, general dimensions, tables. International Register Co.

167 Gage, Valve Selector—This slide selector is designed for easy selection of correct size and type of liquid level gages and valves. It condenses a wealth of specifications, sizes and other data in easy-to-use form. Gives size numbers, visible glass and center-to-center connections for the complete line of gages in all types and pressure groups. Jerguson Gage & Valve Co.

168 Variable-Area Flowmeter—Specification Bulletin 10A1152 describes a variable-area flowmeter (with maximum pressure rating of 300 psi) that may be also used for elevated temperature applications for both liquid and gas service. Gives operational limits, materials of construction, performance, capacity tables, and other technical data. Fischer & Porter Co.

169 Valve-Regulator Tips—Installation, operation and maintenance instructions for Rockwell-Nordstrom valve-regulators are described in Bulletin 1099, 16 pp. This valve-regulator is a pneumatically controlled, cylinder operated, lubricated plug valve-regulator designed for high-pressure, large-volume gas regulation with minimum pressure loss. Typical installations, mounting and piping arrangements are shown. Also included are drawings and characteristic curves. Sections are devoted to trouble checking orifice and nozzle cleaning. Meter and Valve Div., Rockwell Mfg. Co.

BULLETINS

(Begins on page 23)

170 Process Instruments—Described in 52-pp Catalog 2 is a line of process instruments, including indicators, transmitters, recorders and controllers for flow, pressure, temperature, density, viscosity and consistency. Photos, drawings and diagrams are included, with detailed selection data, capacities and specifications, dimensions, operational limits curves, sizing nomographs, and other data. Fischer & Porter Co.

171 For Difficult Fluids—Bulletin 19A describes metal tube rotameters for measuring the rate of flow of hazardous and high pressure fluids at temperatures up to 400 F. Presents simplified instructions for sizing rotameters for liquid service, as well as tables of dimensions, sizes, and capacities, and sectional drawings. Instrument Div., Schutte and Koerting Co.

172 Crane Control—Bulletin GEA-6867, 8 pp, describes company's 7400 line a-c reactor crane control. Application data, information on installation and maintenance, performance curves, explanation of static reversing control, and schematic diagrams of control systems included. General Electric Co.

WELDING, HARD SURFACING

173 Gas Welding, Cutting—Catalog 586, 34 pp, covers all phases of the gas welding and cutting business. Included in the catalog are welding torches and tips, cutting torches and tips, regulators, and welding and cutting accessories. Also included are specification sheets to meet all types of gas welding and cutting needs. Harris Calorific Co.

174 Sprayed Metal Coatings—Bulletin 136A is an 8-pp engineering data bulletin on wire and powder sprayed coatings of metals and ceramics. Covers basic characteristics of sprayed metal and ceramic coatings, including hardness, tensile and bond strength of various coatings, plus a wide range of mechanical and electrical - electronic uses. Metallizing Engineering Co., Inc.

TOOLS, METAL WORKING

176 Versatile—Action photos of 42 woodworking operations that can be performed on company's radial saw—everything from cross-cutting, ripping and dadoing to tongue and grooving—illustrate this 12-pp bulletin. Two pages are devoted to accessories such as blades, molding cutters, sanding drums, routing bits, wire brushes, and drilling chucks. Delta Power Tool Div., Rockwell Mfg. Co.

177 Rotary Surface Grinders—Eight-pp Bulletin 2-161-1 describes a rotary surface grinding machine for precision grinding of flat, concave and convex surfaces of small work. Dimensions, specifications and ordering data for standard units and accessories are included. The Heald Machine Co.

178 Concrete Drill—Described in 8-pp Catalog 58 is the 'Gold Digger'—a combination concrete drill/anchor with a protective double plating in a gold color finish. Provides information on the double plating, along with installation-application data and complete specifications. Polis Mfg. Co., Div. Gregory Industries.

179 Cemented Carbides—Featured in 32-pp Catalog C-16 are company's cemented carbides, including brazed tools, inserts and blanks for a variety of applications in the metalworking field. A technical section features charts showing feeds, speeds and grades of carbide materials to use on various cutting operations. Allegheny Ludlum Steel Corp.

180 Precision Products—This 14-pp bulletin describes the mechanical features and gives complete specifications on company's line of industrial chucks, as well as chuck keys, arbors, chuck repair parts, and portable drill attachments. A fold-out chart gives essential information at a glance. Supreme Products Corp.

181 Hydraulic Cutting Tools—Special purpose high thrust hydraulic cutting tools are featured in 70-pp Catalog 158. Catalog is divided into nine sections according to general types of material to be cut—wire and rod, steel billet, etc. Also included are sections on fabricating, auxiliary power equipment, and optional extras. Thrust data charts for punching and riveting, as well as recommendation charts for cutting of mild, high carbon, and alloy steel rods are included. Both manual and electrical valve control methods are described. Manco Mfg. Co.

182 Cold Cleaning Solvent—This technical report presents a new "safety in use" approach for evaluating relative safety of solvents used in cold cleaning of metal parts. Establishes a concept of a relative safety index for solvent evaluation based on maximum allowable concentration, vapor pressure, evaporation rate. Stresses advantages of perchlorethylene for cold cleaning. Electrochemicals Dept., E. I. du Pont de Nemours & Co.

183 For Cutting Fluids—Described in this illustrated folder is a bacterial inhibitor designed to extend the life of soluble oils and emulsions, eliminate odor and spoilage due to bacterial contamination. Technical data are included, as well as specifications and performance results. Eli Lilly and Co.

SEALS, SEALING RINGS

184 Metallic Sealing Rings—Eight-pp Form 895 covers performance and use of metallic sealing rings. Illustrates and defines four major types of sealing rings, and discusses combinations of materials used by this manufacturer. Drawings show typical applications. Offered with bulletin is a 4-pp specification table on most widely used sealing rings. Metal Products Div., Koppers Co., Inc.

185 Mechanical Seals—Precision mechanical seals for almost every rotating shaft sealing problem are described in this bulletin. Design features are illustrated with cutaway views and advantages given. Borg-Warner Corp.

OTHER EQUIPMENT

186 Carbon and Graphite—Property, application and performance data on a wide range of carbon and graphite products are provided in 56-pp Catalog 40B. Explains how the basic qualities of the carbon atom form the basis for different carbon and graphite grades. Chemical, mechanical, electrical and refractory applications are described. Stackpole Carbon Co.

187 Magnetic Equipment—Products described in Bulletin 99 include equipment for protection against tramp iron such as magnetic pulleys; suspended magnets; drum, plate, grate and spout magnets, and electronic metal detector; lifting, holding and roadsweeping magnets; parts separators, hand magnets; portable drill stand magnets and others. Stearns Magnetic Products, Div. Indiana Steel Products Co.

188 Steel Craftsmanship—Coordinated engineering, fabrication and erection services offered by this company are described in "Creative Craftsmanship in Steel." Booklet also illustrates and describes storage and pressure vessels, Hortonclad and special alloy structures and the Horton pickling process. Chicago Bridge & Iron Co.

189 Flexible Metal Connectors—Illustrated and described in 16-pp Catalog 658 is a wide selection of standard flexible metal hose connectors, as well as flexible nipples, pipe, pump connectors, vibration absorbers, Freon connectors, gas connectors, space heater connectors, dryer connectors and water connectors. Cobra Metal Hose.

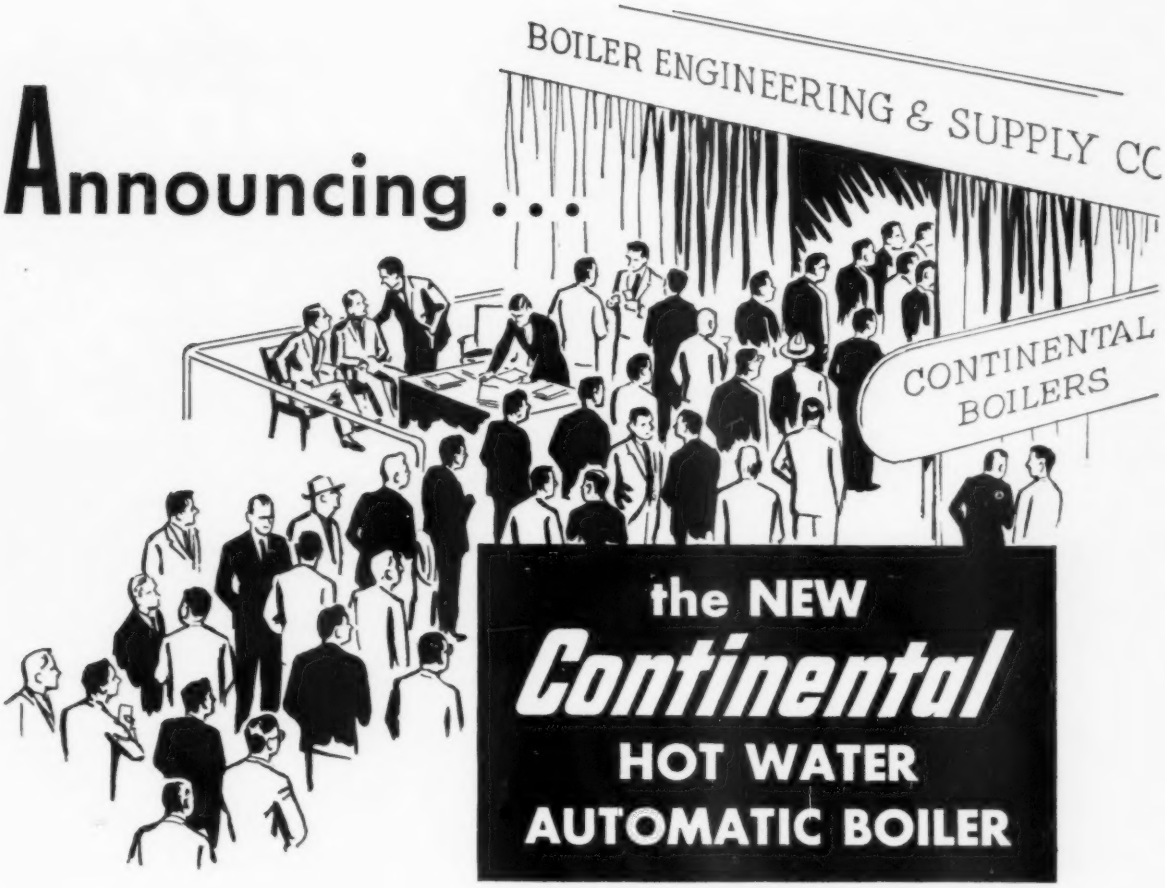
190 Spray Products Explained—Information on history of spray products and their applications is provided in this 16-pp booklet. Covers aerosol packing, development of pressure containers and valves, methods of filling and principles of operation. Lists manufacturer's aerosol products including rust inhibitor, plastic spray, tool maker's ink and cleaning oil, lubricating oil, wire rope lubricant, multi-purpose grease, open gear grease, glass frosting, others. Crown Industrial Products Co.

191 Electro-mechanical Kits—Sixteen-pp Bulletin TDS-1110-1 provides features and specifications on company's electro-mechanical assembly components, including mounting components, component hangers, component clamps, bearing hangers, shaft components, gears, service units, limit stops, switch assemblies and clutches and differentials. Features and advantages are detailed and mounting diagrams included. Servo Corp. of America.

192 Product Data—This 12-pp Products List describes company's chemical, metallurgical and mineral products. Products are compiled in three lists, according to uses and areas of interest, processes and markets. Specifications are included for the various products in the line. Foote Mineral Co.

193 Fiber Cartridge Filters—Depth-type fiber cartridge filters for full flow filtration of all types of fluids are presented in 12-pp Catalog 53-101. Selector chart, cartridge life curve, flow rate table, and other information is included. The Cuno Engineering Corp.

Announcing . . .



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BOILER ENGINEERING & SUPPLY CO., INC.
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BULLETINS

(Begins on page 23)

194 Industrial Dust Control—Advantages and features of company's flexible hose and duct for use in industrial dust control are detailed in Bulletin 82. Photographic case studies of typical applications are included, as well as selection, pricing and accessory information. The Flexaust Co.

Among Recent Bulletins Of Special Events

195 Ion Exchange Explained—Nalco Bulletin Z-5, "Water Conditioning with Nalcite Ion Exchangers," is a 60-pp handbook explaining the ion exchange technique and detailing several types of ion exchange systems and the quality of water supply each can produce. Softening, dealkalizing, and demineralizing processes are discussed. National Aluminate Corp.

196 Air Circuitry — The role of pneumatic control in industrial operations—or use of "air circuitry" in application of air control to automation—is subject of two booklets. One, 24 pp, describes devices and fundamentals of air circuitry, and contains data designed to promote better use of compressed air. The other booklet contains 28 pp of information on basic pneumatic control. Westinghouse Air Brake Co.

197 All About Slip-Sticks—"Slide Rule? May I Help . . ." is a 24-pp booklet on how to select a slide rule. Written and illustrated by Don Herrold, it describes slide rule scale designs and arrangements, materials used in slide-rule construction, and teaching aids and accessories for the slide rule. Also presents a variety of company's slide rules including the Log Log Duplex Decitrig, polyphase and Mannheim types, special purpose models and pocket versions. Keuffel & Esser Co.

198 Elastomers in Industry—Facts about use of the synthetic rubbers, Neoprene and Hypalon, in industry are featured in this 16-pp bulletin. A table shows how the products compare in important properties, and other tables show comparative properties of industrial rubbers and chemical resistance of Neoprene and Hypalon. Typical applications are pictured. E. I. Du Pont De Nemours & Co., Inc.

199 Protective Equipment—Catalog 28, 48 pp, is a guide to the selection, application and maintenance of protective equipment for hundreds of industrial applications. A detailed chart lists recommended equipment for 17 basic classifications of hazards. There's also information on how to specify lenses as well as to select correct filter lens where conditions warrant. Complete product descriptions are included for glasses, goggles, special purpose eye protection, hoods. Chicago Eye Shield Co.

200 On Chemical Processing—Six-pp Bulletin WC-120 details company's equipment and services available in the field of chemical processing. Among processes described are ion exchange, sedimentation, filtration and flotation. Equipment for each is illustrated. A highlight of bulletin is a section on the meaning of recent methods in processing. Graver Water Conditioning Co.

201 Heat Exchangers—Comprehensive information on heat exchangers and pressure vessels for the process and power industries is presented in 16-pp Bulletin M581. Photos and diagrams illustrating basic types of heat exchangers and pressure vessels are included, as well as two charts—"Key to Heat Exchanger Types" and "Preliminary Setting Diagram." Southwestern Engineering Co.

202 Cyclone Controls—Designs and controls of company's cyclones are featured in Bulletin 1400. Proper apex discharges relating to classification efficiency of a cyclone in both open and closed circuit applications, cut-away drawings and an apex capacity chart for present cyclone users and others with classification problems are covered. Equipment Engineers Inc.

DATA FILE of literature for the plant engineer's library

STANDARD CATALOGS, bulletins and handbooks are listed to help plant engineers maintain a permanent data file. To get these free catalogs, circle item numbers of those wanted on postage-free cards provided for you on pages 161-162.

MATERIALS HANDLING

301 For Overhead Handling—Booklet 2008-M, 12 pp, is replete with illustrative material on principal components of overhead handling systems. Track design and advantages of supporting it flexibly are described, and formulas and figures for comparing various track systems are included. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

302 Overhead Dispatch System—Form F-192, 8 pp, describes an automatic overhead dispatch system designed to solve a variety of materials handling problems. Outstanding advantages are listed and typical installations are described and illustrated with detailed diagrams. Component equipment utilized in this system is described. Richards Wilcox Mfg. Co.

303 Vertical Transportation — Selection of vertical transportation for every traffic-moving job is detailed in 32-pp Bulletin A-382. Various types of elevators and escalators for a variety of commercial and industrial applications are described and dimensional diagrams illustrating arrangements included. Recommended sizes and capacities are listed. Otis Elevator Co.

304 Electric Hoists—Twelve-pp Bulletin DH 133B describes Speedway electric hoists of 500- to 4000-lb capacities. Fully illustrates and explains design features and gives details on suspensions and conducting systems. Clearance data included. Wright Hoist Div., American Chain & Cable Co., Inc.

305 Hand Powered Cranes—Twenty-pp Catalog 63 describes design, construction and applications of company's hand-powered traveling cranes. Data tables are included, as well as dimensional diagrams and assembly diagrams, and photos of typical installations. Reading Crane & Hoist Corp.

306 Trolley Conveyor—Described in 8-pp Bulletin T-58 are features and advantages of company's trolley conveyor for light-duty applications. Specifications and dimensional diagrams are included. as well as installation instructions. Mathews Conveyer Co.

307 Dragline Conveyors—Trukveyors, a dragline conveying medium designed to reduce unit cost of materials handling in warehouses and plants, are described in detail in 24-pp Book 2497. It covers both the overhead and in-the-floor types, illustrates component features with photos and drawings, and gives installation data. Link-Belt Co.

308 Steel Conveyor Belts—"A profitable approach to the selection of steel processing conveyor belts" is the subject of this 16-pp bulletin. Simplified selection, standard specifications, and installation information are included. The Colorado Fuel and Iron Corp.

309 Sheet and Coil-Lifters—Bulletin SL-30, 16 pp, illustrates and describes various types of standard and semi-special lifters for one-man or automatic handling of sheet and coil stock. Advantages and design features are detailed and tables listing dimensions included. Cullen-Friestedt Co.

310 Belt Idlers — Eight-pp Bulletin 925 tells the story of company's belt idlers from development to installation. Outlines double flexible diaphragm seal which keeps grease in, dirt out, and illustrates features of idlers through cutaway. Also shows typical installations. The Jeffrey Mfg. Co.

311 Self-Dumping Hopper—Described in Bulletin 260 is a self-dumping hopper for low-cost handling of wet or dry, hot or cold, bulk materials. A variety of standard models are pictured and described and construction data furnished. Roura Iron Works, Inc.

312 Casters and Wheels—Twenty-pp Condensed Catalog 157-G covers many styles of casters, wheels and glides. Listings cover products for industrial, institutional, office and other applications. Installation guides, selection tables, descriptions and specifications are included. The Faultless Caster Corp.

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Using an entirely new method of construction, Alcoa now gives you a new, low-cost grating type stair tread of lightweight Alcoa® Aluminum. Except for its abrasive nosing, this new stair tread is precision-cast in one piece from an alloy especially selected for its high corrosion resistance and ductility. As a result, you get all these valuable benefits:

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NO MAINTENANCE, NO PAINTING—thanks to rust-free, corrosion-resistant Alcoa Aluminum.

GREATEST STRENGTH AND SAFETY—because one-piece casting distributes concentrated loads more uniformly over the bearing bars. Nosing is Alcoa Abrasive Tread Plate to combine unequaled skid resistance with the strength and ductility of metal.

MORE SANITARY CONSTRUCTION—casting in one piece eliminates cracks and crevices which might entrap dirt.

They are ideal for chemical processing, refining, food processing, sewage treatment and papermaking. Use the convenient coupon to get your free copy of our new booklet containing detailed information on new grating type Alcoa Aluminum Stair Treads. Or if more convenient, call the Alcoa sales office listed in the Yellow Pages of your telephone directory.

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SIZES AVAILABLE:
Lengths: 24", 30", 36", 42".
Standard width: 10". Special widths: 8 21/32", 7 11/16", 6 13/32".

SPECIFICATIONS:
Bearing Bars (Nom. Dimen.): 9/32 x 1 1/2" on 1 5/32" centers.
Crossbars (Nom. Dimen.): 1/8" x 1" on 3" centers.
Carrier Plates: Mounting holes located according to accepted standards.
Abrasive Nosing: Alcoa Abrasive Tread Plate.

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Structural: "As-fabricated" surface for standard uses.
Polished: For sanitary stairways—with top surface belt sanded and nosing hand-polished.
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DATA FILE

(Begins on page 166)

SLINGS, CHAINS, WIRE ROPE

313 Chains, Sprockets—Catalog 757, 68 pp, on company's stock roller chains and sprockets, stresses advantages gained through roller chain use, and pictures some typical roller chain drives. Tells how to select a stock roller chain drive. Provides specifications, ratings, prices and engineering data required for ordering. Book is generously illustrated with photos and drawings. Diamond Chain Co., Inc.

314 Drop Forged Fittings—Comprehensive data on company's line of drop forged fittings for wire rope and chain are presented in 40-pp Catalog 950-2. Includes specifications, dimensions, rated capacities and weights. Also announces range of sizes and capacities in many of items listed, as well as new products, including clips. Crosby-Laughlin Div., American Hoist and Derrick Co.

MAINTENANCE

315 Basic-Roofing Information—"What You Should Know About Your Roof" is a 40-pp clearly illustrated booklet which tells what makes a roof fail, how to recognize signs of roof deterioration, what to do to keep a roof in good condition. Discusses recommended roofing practices, essentials of good re-roofing job. Johns-Manville.

316 Urethane Coatings—Properties and characteristics of urethane surface coatings are outlined in this 16-pp bulletin. Potential uses for urethane varnishes, paints and lacquers are detailed, and a number of test sites in a variety of industries where coatings are in use are described. Mobay Chemical Co.

317 Industrial Vacuum Cleaning — Twelve-pp Bulletin 155 B describes both stationary vacuum cleaning equipment and portable industrial vacuum cleaners, the latter in both light and heavy-duty types. Recent improvements in collection and dumping methods are covered, and photos show application to conveying, reclaiming, bench work. Spencer Turbine Co.

318 Vacuum Units—This bulletin describes heavy-duty, portable vacuum units designed for a variety of plant housekeeping jobs. Application in removing litter, conveying or reclaiming materials, and collecting hazardous matter is covered. Invincible Vacuum Cleaner Mfg. Co.

319 For Overhead Maintenance — Bulletin G205RR, 8 pp, tells how to control costs when maintenance goes above arm's reach — for painting and cleaning, electrical work, etc. Pictures a variety of scaffolding arrangements. Provides brief product information on steel and aluminum scaffolding, ladders. The Patent Scaffolding Co., Inc.

TOOLS, MACHINE SHOP

320 Handy Fastening Tool — Two booklets show different ways in which this fastening tool can be used. One booklet shows how the tool can be used for plant maintenance—fastening conduits, bus ducts, junction and outlet boxes, surface raceways, fixtures and frames, duct straps, fan and blower mounts, etc. The second booklet indicates the correct fastening and charge to use to fasten materials of varying thickness to concrete or steel. Ramset Div., Olin Mathieson Chemical Corp.

321 Pipe Tools—Ordering and application information on Ridgid pipe tools is provided in 16-pp illustrated Catalog 7596R6. Wrenches, cutters, threaders, reamers, vises, and others are pictured and described, also power drives, pipe and bolt threading machines, oilers. The Ridge Tool Co.

323 Portable Electric Tools—Form 10 features a complete line of portable electric tools including drills, screwdrivers, impact wrenches, magnetic drill presses, sanders, grinders, hammers, holesaws, forged tools, wire wheel brushes. The Black & Decker Mfg. Co.

324 Data for the Shop—"Fluids and Facts for Metal Working" is a pocket-size booklet of about 44 pp. A section on metal working fluids covers their function and selection, preparation and use of soluble oils and paste compounds, and prevention of dermatitis. Conversion tables, steel numbering systems, machinability ratings included. Standard Oil Co. (Ind.)

325 Vinyl Machinery Mount — Advantages of company's vinyl machinery mount are outlined in this illustrated brochure. Installations are shown. Clark, Cutler and McDermott Co.

CONSTRUCTION

327 Aluminum Building Products—This 36-pp catalog covers company's line of aluminum industrial building products. Cites advantages of aluminum, pictures some installations. Installation data, weights, dimensions and rough-in details are provided on corrugated roofing and siding, V-beam roofing and siding, ribbed siding sheet, perforated corrugated sheet, flat flashing sheet. Aluminum Co. of America.

328 Pole-Type Buildings—Easy steps in building pole-type industrial and other buildings are presented in this 8-pp pocket-size booklet. Deals with uses of pressure-treated, rot and termite resistant poles and lumber. Contains practical step-by-step guide, with diagrams, covering site location, pole setting, roof construction, splash boards, application of siding. Wood Preserving Div., Koppers Co., Inc.

329 Replacement Glazing — Twelve-pp Booklet PL-251 gives detailed information on glazing industrial and other buildings with flat panels of the acrylic plastic, Plexiglas. Written for plant engineers concerned with frequent breakage of windows or other glazing problems, this practical booklet gives properties of this sheet. Plastic Dept., Rohm & Haas Co.

330 Building Panels, Panes — Form SL-3, 8 pp, presents Structoglas A reinforced plastic corrugated building panels and flat panes, giving information on product's mechanical and physical properties, chemical resistance, colors and finishes. Installation instructions cover sidewall mounting, roof construction. Structoglas Div., International Molded Plastics, Inc.

331 Face Brick — Brochure B-158 contains a set of 24 color reproductions which illustrate the wide range of glazed and unglazed facing brick for all types of interior and exterior walls. Also included is detailed information regarding size, color and availability of various types. Natco Corp.

332 Steel Floor Plate—Skid resistance and other advantages of USS multigrip rolled steel floor plate are stressed in this illustrated bulletin. Also gives dimensions, data on allowable loads. United States Steel Corp.

333 Wire Partitions — The modern, economical approach to plant layout problems is described and illustrated in 8-pp Bulletin P-55 on wire partitions and custom enclosures. Describes important design and construction features, and includes specification data and dimensional diagrams. Wire and Iron Products Inc.

334 Non-Slip Flooring — Algrip, an abrasive rolled steel floor plate described as non-slip even on steel inclines, is the subject of Booklet AL-29, 8 pp. Discusses safety features, fabricating. Alan Wood Steel Co.

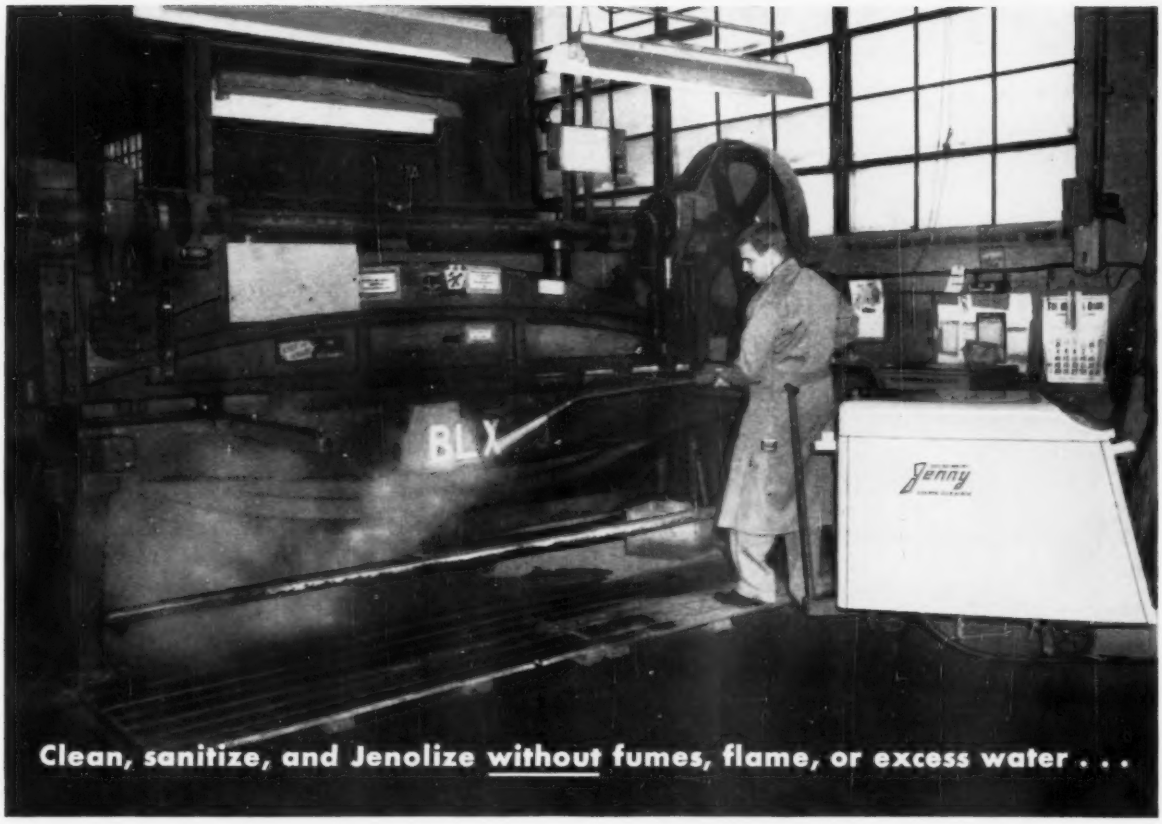
335 Foundation Pipe Piles—Comprehensive information on Taylor Forge spiral-weld foundation pipe piles is presented in a 24-pp Form F-5677. In addition to detailed specifications, the illustrated booklet describes a number of pipe-pile installations and includes driving logs. L. B. Foster Co.

INSULATION

336 Glass Fiber Insulation — Among the company's products described in this illustrated bulletin are three kinds of flame-blown glass fiber insulations used for thermal and acoustical applications. Charts are included illustrating the acoustical and thermal values. L. O. F. Glass Fibers Co.

337 Insulation Specifications—This set of six specifications covers applications of Foamglas insulation for industrial equipment and piping. Each booklet contains tables of suggested thicknesses of insulation to be applied, drawings of installation procedure, supports, and recommended finishes. Booklets are devoted to low-, medium-, high-, and dual-temperature equipment and piping, to underground piping, and spheres. Pittsburgh Corning Corp.

338 For Insulation Protection—Provided in this comprehensive looseleaf manual is technical information covering practically every requirement for insulation protection. An aid to proper adaptation and application of mastics, flashing compounds, adhesives and surface coatings, this book presents information classified as to industry usage, as power, process, cold storage. Book is available to qualified plant engineers. Benjamin Foster Co.



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DATA FILE

(Begins on page 166)

HEATERS, HEATING

339 Unit Heaters—Catalog 158, 28 pp, contains performance and application data on company's line of unit heaters, including design and construction details, dimension diagrams, and tabulated information on steam capacities, conversion factors, hot water capacities, performance factors, and heat transfer coefficients. Modine Mfg. Co.

340 Electric Heating Units—Catalog 50, 50 pp, contains complete engineering data on electrical heating units and equipment, including strip elements, fin-strip elements, tabular elements, cartridge elements, ring elements, immersion heaters, circulation heaters, radiant heaters, forced air duct heaters, unit heaters, hot plates and others. Includes photos, dimensional drawings, prices, standard rating tables, and specifications. Edwin L. Wiegand Co.

Postage-free Reader Service Cards make it easy to order catalogs. Cards are provided on pages 161 and 162.

341 Heating and Ventilating—Company's "comfort curtain" principle of heating and ventilating is described in this 8-pp bulletin. Advantages are detailed and typical installations pictured through drawings and photos. Dimensions and specifications are included. Lennox Industries Inc.

342 Plumbing, Heating Supplies — Edition H is the current edition of this company's 126-pp general catalog on plumbing and heating repair parts, tools and accessories. Indexed and illustrated, the catalog gives detailed information on uses. J. A. Sexauer Mfg. Co., Inc.

343 Stainless Steel Heaters — Complete description and specifications on stainless steel direct-fired heaters are included in 6-pp Bulletin F-57A-RO. Cutaway views, drawings and diagrams illustrating design and construction features are included. Reznor Mfg. Co.

DUST, FUME CONTROL

344 For Dust Collection—A collection of product sheets providing application suggestions and specifications on Dustkop equipment designed to solve a wide range of dust handling problems is provided in the Series 700 bulletins. Various models are described and illustrated. Aget Mfg. Co.

345 Industrial Dust Control—A wide variety of collection methods for industrial dust control is described in 16-pp Bulletin 922. A typical case history is included as well as photos, cutaway views, drawings and capacity data on the various units. Pangborn Corp.

346 Industrial Dust Control—Bulletin 104, 36 pp, on company's dust filters, gives detailed information about dust

*with this valve design**

COMPRESSOR GOING STRONG 36 YEARS AND 4 OWNERS LATER

Customers sometimes ask us what it takes to wear out a Pennsylvania compressor.

We don't blame them. Endurance records are extraordinary. Downtime and maintenance costs are extremely moderate.

One Pennsylvania Compressor, for example, originally purchased by a Philadelphia firm in 1922, has been in continuous operation for *36 years!* Moreover, because of mergers or plant alterations, the compressor has changed hands three times and for the last ten years has been delivering as faithfully as ever for its *fourth* owner.

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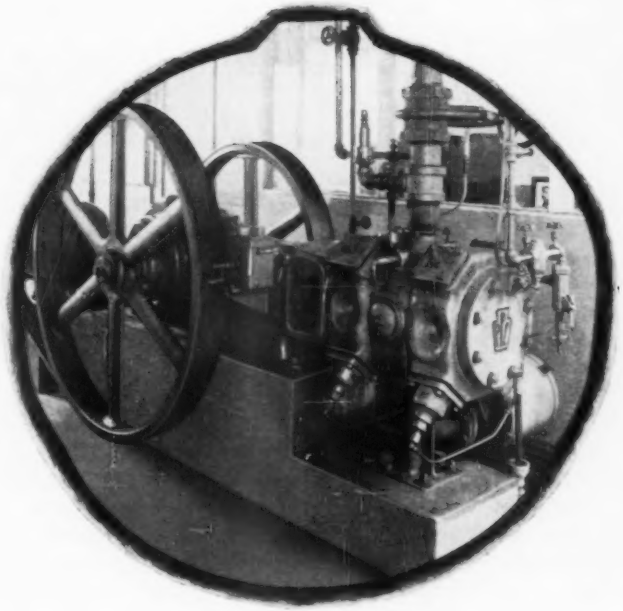
Somewhere in our line is a compressor that will stay on the job for you. Why not write for our brochure COMPRESSORS FOR INDUSTRY describing Pennsylvania compressors from 10 to 350 hp.



***With this valve,** Pennsylvania compressors will perform faithfully for years. It is the Air Cushion Valve, constructed without nuts, bolts, or screws. Stainless steel valve discs lift against a soft cushion of air; there is no flexing or bending action to weaken them. They will remain perfectly flat and tight seating over long periods of service.

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DATA FILE

(Begins on page 166)

control systems and how to engineer them. Includes description of the Roll-Clean Dynaclone dust filter, as well as information, capacities and dimensions for other Dynaclone and automatic continuous dust filters, intermittent filters, others. The W. W. Sly Mfg. Co.

FANS, VENTILATING AND AIR CONDITIONING

347 Pressure Fans—Catalog 857 fully covers a new line of fan equipment for volumes from 300 to 12,000 cfm and pressures from 10- to 50-in. sp. Dimensions and capacity tables included along with selector charts. Clarage Fan Co.

348 Mechanical Draft Fans—Eight-pp Catalog 1361 describes centrifugal fans designed for handling abrasive gases at elevated temperatures. Complete application, performance, and physical data are given, as well as a list of optional accessories. Sturtevant Div., Westinghouse Electric Corp.

349 Air-Moving Equipment—Bulletin DB 45-58, 20 pp, contains detailed information on company's line of roof ventilators, bifurcators, axial flow vent sets, and air jets. Bonded performance ratings are listed on tables, and dimensional data and specifications included, as well as photos, cutaway views and diagrams. DeBothezat Fans Div., American Machine and Metals, Inc.

BOILERS AND GENERATORS

351 Self-Contained Boilers—Bulletin AD-162, 8 pp, describes company's complete line of self-contained boilers for heating and processing steam or hot water. Design features and advantages are detailed and a cutaway view showing flow of air in the forced draft system is included. Cleaver-Brooks Co.

352 Packaged Automatic Boiler—Six-pp Bulletin 1241 describes company's packaged automatic boilers for both air atomizing and pressure atomizing, for oil burning and for gas. Covers operating features and includes chart listing ratings, dimensions, weights. Orr & Sembower, Inc.

353 Boiler Construction—Bulletin BE100 describes advantages of practical boiler construction with 2 pass design, featuring comparable results with equal heating surface, but with Continentals two-pass features—turbulent spinning gas technique - uniform heating - no refractory baffles and symmetry of furnace and tube layout. Boiler Engineering & Supply Co.

354 Package Unit Steam Generators—Bulletin PSG-2 has line drawings, photos, and engineering data on portable type units from 10,000 lb/hr to 40,000 lb-hr steam capacities. These units are available in three standard pressures of 175, 250, and 375 psi gage. Henry Vogt Machine Co.

355 Package Generators — Featured in this 6-pp bulletin is a line of package generators designed for hot water heating systems. General specifications are included, as well as dimension tables, clearances for typical layout, capacities and operating data. Cyclotherm Div., National-U.S. Radiator Corp.

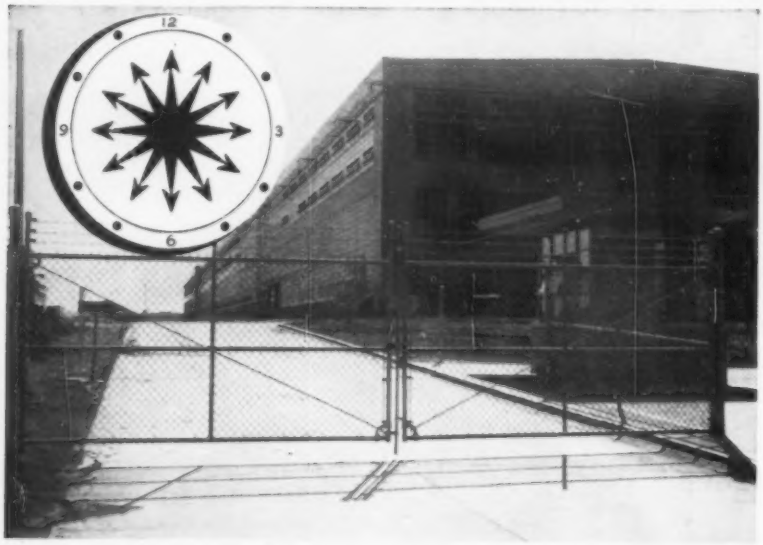
WATER TREATMENT

356 Products and Services—Bulletin GSP-901 24 pp. describes products and services of this company and its various divisions. These include ring balance instruments, components for control systems, electronic devices, force measuring devices, water and steam treatment, testing equipment. Hagan Chemicals & Controls, Inc.

357 Feedwater Treatment — Process Bulletin B1, "Treatment of Boiled Feedwater by the Direct, or Indirect Method," discusses advantages of direct treatment, as a complete treating program or as a supplement to external systems. Explains why direct treatment is convenient, economical, and complete. National Aluminate Corp.

MECHANICAL POWER TRANSMISSION

358 On V-Belts—Testing, inspection and control of V-belts is covered in 16-pp Booklet S-51107. Describes in text and pictures how raw materials and finished belts are tested and inspected.



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One section explains quality control procedures, and another section is concerned with experimental production. Goodyear Tire and Rubber Co.

359 Flexible Couplings — Condensed Engineering Catalog 51-A contains excellent data on the choice and use of company's flexible metal couplings for power transmission. Tells advantages of these couplings and discusses design. Thomas Flexible Coupling Co.

360 Dihederal Spindle Couplings — Catalog 64, 12 pp, covers the development, production and application of company's dihederal spindle couplings for roller drives. Cross-section drawings and dimensional data are given on sizes and types of spindle couplings. Ajax Flexible Coupling Co., Inc.

LUBRICATION

361 Plug Valve Lubricants—Reference Book 39—Section 5A, 16 pp, describes company's plug valve lubricants and lubrication accessories. Standard lubricant table gives detailed description and extreme temperature range of each lubricant. Suggested lubricants listed. Homestead Valve Mfg. Co.

362 Lubricant Data Book—Sixteen-pp Lubriplate Data Book offers practical information on lubrication of machinery. Gives product data on grease type and fluid products, hydraulic oil, compressor oil, motor oil. Suggestions on applying lubricants under various conditions given. Lubriplate Div., Fiske Bros. Refining Co.

363 Industrial Greases — Described in Technical Bulletin 50 are a group of greases suitable for all types of industrial applications at temperatures from zero to 300 F, in wet, moist or dry surroundings. Sun Oil Co.

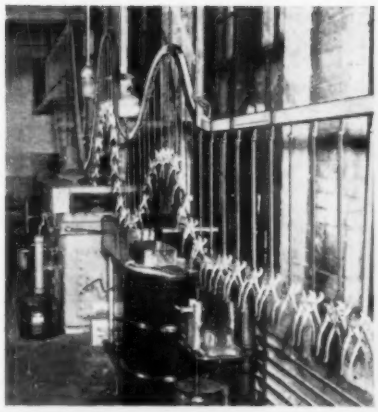
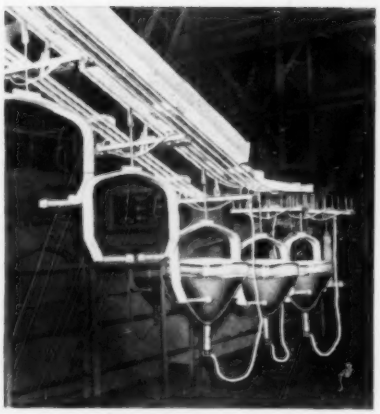
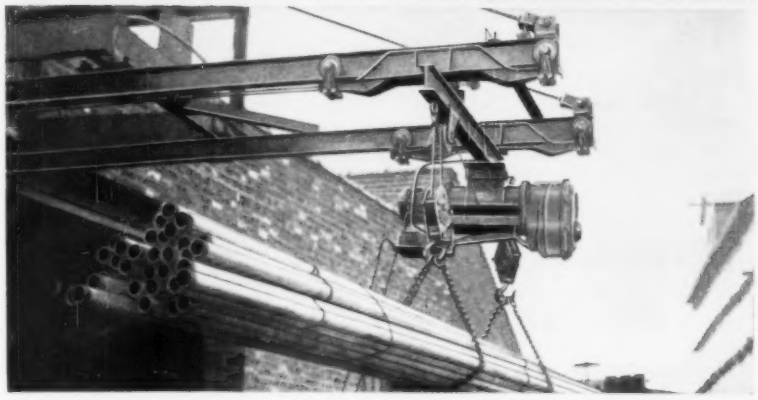
PUMPS, COMPRESSORS

364 Solids Handling—Bulletin 121-A, 8 pp, describes non-clog pumps for handling solids in suspension. Included are vertical, horizontal and close-coupled types used to handle liquid components of industrial processes, industrial waste, and for such pumping applications as water supply, drainage. Aurora Pump Div., The New York Air Brake Co.

365 Vertical Pumps—Bulletin 726.2, 12 pp, describes company's line of heavy duty vertical centrifugal sump and process pumps. Includes specifications, sectional views, performance ratings, and a chart of construction materials for interchangeability. Goulds Pumps, Inc.

366 Sewage Pumps—Twelve-pp Bulletin 7500 illustrates heavy-duty wet and dry pit sewage pumps, small vertical sewage pumps and standard and submersible cellar drainers. Includes performance tables for selecting pumps, dimensional drawings and details of construction. The Deming Co.

367 Pump Data—Featured in Bulletin 250 are centrifugal pumps, reciprocating pumps, screw pumps and rotex pumps designed for pulp and paper, boiler plants, marine, chemical, food, pipeline, textile and other applications.

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DATA FILE

(Begins on page 166)

Typical applications for each pump in the line are listed, as well as range and construction. Warren Pumps, Inc.

368 Single Suction Pumps — Ball bearing single suction pumps are illustrated and described in 24-pp Bulletin 976-G. General data and specifications are included, as well as rating tables, outline dimensions, sectional reference drawings, and other features. Buffalo Pumps, Div. Buffalo Forge Co.

369 Low Pressure Compressors—Eight-pp Bulletin A-95 describes a line of low pressure compressors for heavy duty industrial applications. Engineering design features are detailed and advantages explained. Joy Mfg. Co.

370 Multi-Stage Compressors—Bulletin 150, 64 pp., presents company's multi-stage centrifugal compressors in both horizontally-split and vertically-split types. Advantages, construction features and application of each type are covered, and text is illustrated with photos and cutaways. A section of general information discusses fundamentals of centrifugal compressors and drivers for them. Also includes engineering data. Clark Bros. Co.

371 Industrial Air Compressors—Advantages of company's line of industrial air compressors are detailed in 16-pp Catalog 5510. Tables indicating weights, code words and dimensions are included, as well as cutaway views showing design and operation details. Compressor specifications are given, and dimensional diagrams and other material included. Schramm, Inc.

PACKINGS, SEALS

372 Internal Mechanical Seal—Bulletin CP-575 covers chemical and power internal seals styles IUA and IUB. They are recommended for use at pressures from 28" Hg vacuum to 100 psi and temperatures from —80 to 500 F. Chemical & Power Products, Inc.

373 Piston Packing—Sixteen-pp Bulletin 5503 presents engineering data on Darcova Pumcups for packing pistons of air cylinders, hydraulic cylinders and reciprocating pumps. Included are operating diagrams and a list of typical installations, as well as helpful data on Pumcup compositions, textures and types made available for specified pressure and other corrosive conditions. Darling Valve & Mfg. Co.

374 Rotary Seal Data—Plant engineers concerned with process equipment will find it easy to select the right type of mechanical seal for a specific operating condition with Form 480, a 16-pp, catalog on rotary mechanical seals. It is extensively illustrated with cutaway views showing stuffing box installation details. Durametallic Corp.

ELECTRICAL

376 Variable Speed Motors — Sixteen-pp Bulletin F-1797, revised, outlines many reasons why variable speed motors can be used to improve production, and it includes illustrations of all types of company's Varidrive motors, as well as their mechanical features, remote controls, etc. U. S. Electrical Motors, Inc.

377 Immersible Motor—Bulletin 2300 describes applications in which the submerged motor is close-coupled to pumps, agitators and mixers, eliminating long shaft connections, intermediate bearings, couplings and special bases. Cutaway shows engineering features. The Louis Allis Co.

378 Rerated Integral HP Motors—Bulletin 520 describes polyphase open-protected motors in re-rated NEMA frames. Ratings through 200 hp. Motor Div., Robbins & Myers, Inc.

379 Conductor Systems—This 36-pp catalog describes the Insul-8-Bar systems of mobile safety electrification for cranes, monorails and moving machinery. Includes photos and descriptions of typical installations, engineering data, installation procedure, a photo-text list of items that comprise these systems. Insul-8-Corp.

380 Varnished-Cambric Cables—Bulletin VC-56-10M, 22 pp, covers varnished-cambric cables in a voltage range of 600 to 5000 v for single and three-conductor cables braided or lead sheathed. Armored cable constructions in both galvanized steel armor and aluminum armor are shown. Rockbestos Products Corp.

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381 For High Voltage Cable—Test results and service records on an improved butyl rubber compound for high-voltage cables are announced in 12-pp Bulletin EB-27. Covers resistance to ozone, operating temperature, high-voltage, dielectric strength, aging, insulating resistance, moisture absorption. Anaconda Wire & Cable Co.

382 Mineral Insulated Cable—Properties and applications of mineral insulated cable are described in this 12-pp bulletin. Method of fabrication is detailed, as well as installation procedure, construction and performance characteristics, and dimensional data is included. General Cable Corp.

383 Secondary, Service Cable—Bulletin RCP-361, 8 pp, on neutral-supported secondary and service drop cables, provides specifications for both types, including scope of use, conductors, insulation, construction, tests and put ups. Charts show number of strands, insulation thickness, size and type of messengers, current carrying capacity. Rome Cable Corp.

384 Protective Relays — Featured in 16-pp Catalog 5-020 are time delay overcurrent relays, directional inverse time overcurrent relays, differential relays, instantaneous overcurrent relays (adjustable setting), inverse time voltage relays, auxiliary relays, ac-dc definite time relays, and reclosing relays. For each model, tabular data and photos cover its applications, features, design, settings. Federal Pacific Electric Co.

385 Enclosed Switches—Catalog 83, 20 pp, Catalog 84, 16 pp, and Catalog 101, 24 pp, describe enclosed switches for industrial uses. Included are general switches designed for use on either a-c or d-c applications, sealed switches, heavy-duty limit switches, hand operated switches, and maintained-contact switches. Micro Switch, Div., Minneapolis-Honeywell Regulator Co.

On pages 161-162 are two postage-free Reader Service Cards provided for your convenience in ordering these catalogs. You may also use the cards to order any literature mentioned in ads.

386 Switch Wiring Diagrams—Bulletin 709 is a 36-pp booklet of typical wiring diagrams for across-the-line starting switches. Indexed and arranged for easy use, this booklet serves as a guide to some of the many ways in which this company's manual and magnetic across-the-line starters can be applied. Allen-Bradley Co.

387 Switches, Controls—Publication EA-100, 76 pp, offers quick selection data on manufacturer's line of safety switches, service control, motor control and accessories. Fully illustrated, booklet provides ordering information, brief text on applications, features, heater coil selection data, and general information. Cutler-Hammer, Inc.

388 Electrical Equipment Digest—Electrical equipment illustrated and de-

You can do these 40 fastening jobs faster at less cost

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Here are 40 important plant maintenance jobs that you can do faster, better and cheaper with just ONE PAIR OF TOOLS . . . RAMSET® DUO-JOBMASTER® for heavy-duty fastening to concrete and steel and SHURE-SET® for light-duty jobs in concrete and building block. Simple, lightweight tools . . . no drilling, bolting or plugging . . . no power lines, no bulky equipment.

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DATA FILE

(Begins on page 166)

scribed in 160-pp Catalog Digest 141 includes load centers, circuit breakers, low voltage control, fusible service equipment and accessories, meter sockets and troughs, safety switches, panelboards, duct and fittings, starters, other equipment. Square D Co.

389 Fuses for All Uses—This revised edition of manufacturer's complete line, Folder 3, includes illustrations and descriptions of fuses for every purpose. Features dual-element cartridge fuses for time-lag in protection against overloads, and delay renewable fuses and renewal links. Economy Fuse & Mfg. Co.

390 Testing Instruments — Bulletin 19-58, 16-pp, features company's electrical testing instruments, including ohmmeters, ground testers, dielectric test sets, motor, rotation tester, cable fault locating equipment, transformer turn ratio test sets, corona test equipment, frequency meters, tachometers, others. Includes photos and descriptions of each type, including chief features. James G. Biddle Co.

391 Battery Users Manual—Motive-power battery maintenance and repair is detailed in this newly revised edition of company's Battery Users Manual (Bulletin GB-1599A), 44 pp. Developed as a result of in-plant training courses, this book is designed to enable plant engineers to conduct an organized battery training course. Gould-National Batteries, Inc.

392 Battery Service Tips—Latest information on industrial batteries on cycle service, including industrial truck units, is provided in the new edition, about 40 pp, of company's industrial battery service manual. Includes photos, charts, tables, repair methods, maintenance, and salient points on operation, instructions covering repairs. C & D Batteries, Inc.

393 Cable Supports—This information folder contains data on company's cable supporting equipment, telling how to install cable supports, as well as giving advantages of cable trough. T. J. Cope Div., Rome Cable Corp.

LIGHTING, COMMUNICATIONS

394 Illumination Design Data—Basic reference data on interior lighting installations is contained in 48-pp Manual A-4854, which features a section describing footcandle levels required for each group of seeing tasks. These footcandle levels are then related to many kinds of rooms and areas. Westinghouse Electric Corp.

395 Architectural Floodlighting—Eight-pp Bulletin GEA-6437 illustrates various methods of floodlighting industrial plants, public and commercial buildings and others. Provides information on general purpose heavy-duty floodlights. General Electric Co.

396 For the Missile Field—Designing, testing and manufacturing facilites for producing electrical equipment used by the missile industry are featured in 8-pp Bulletin 2707. Condulet electrical equipment and floodlights are described. Crouse-Hinds Co.

INSTRUMENTS, CONTROLS

397 Temperature Controls—Eight-pp Catalog CC, on temperature controls and allied equipment for heating and refrigeration, provides information on recording, indicating non-indicating controls; thermometers; bulb installation accessories. The Partlow Corp.

398 Stroboscope Data — Applications of the electronic stroboscope are illustrated and described in 8-pp Form 766-C. Includes complete descriptive and specification data on the Strobotac —a small, portable stroboscope tachometer—as well as on the Strobolux, the Strobolume and the Microflash. General Radio Co.

399 Gages, Needle Valves—Catalog 76-G consists of a loose-leaf bound collection of literature on gages and needle valves. Various types of gages are illustrated and described, with applications and specifications fully detailed. A section on accessories is included. Jas. P. Marsh Corp.

400 Liquid Level Gages—Condensed Catalog 335 contains 8 pp of information on standard and special function gages and valves. Illustrated with photos and drawings, it includes dimensional drawings, construction features, pressure-temperature graphs and rat-

COMPRESSED AIR DRYERS AND CLEANERS

VAN-AIR DRYERS purify raw compressor air—extract water up to 1.07 lbs. per 1000 cu. ft.—reduce moisture to ZERO-dewpoint—remove contaminating bacteria, scale, etc.—deliver air uniformly clean and dry.

VAN-AIR DRYERS have no elements to heat, regenerate or regulate—average ten minutes care per month—process air automatically with a non-corrosive desiccant (see diagram)—operate with less than 1% pressure drop.

Many plants, shops and labs use the VAN-AIR to protect instruments, testers, circuits, etc. Others use it to prevent fouling of chemicals, compounds, plastics, foods, drugs, etc. Some need it to reduce spoilage in product finishing, spraying, blasting, packaging, assembling, etc. VAN-AIR DRYERS are built in various sizes.

Capacities range from small 10 scfm units to large vessels for entire plant output—up to 8000 scfm and 6000 psig. Write for brochure.

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ings, materials, tables of sizes, specifications and standard and optional features. Jerguson Gage & Valve Co.

401 Graphic Instruments—Featured in 16-pp Catalog 657 is a line of graphic instruments designed to serve a variety of industrial measuring applications. Complete descriptive details on various types of recorders and accessories are included, as well as photos and ratings data. The Esterline-Angus Co., Inc.

402 Hour Meters—Twelve-pp Bulletin 600 describes a line of hour meters designed to tell the actual hours and minutes of engine operation. Features and operation are illustrated and described, and tabulated engineering data and dimensional drawings included. John W. Hobbs Corp.

FLEXIBLE HOSE, TUBING

404 Industrial Hose—Bulletin IH-10 features application and selection data on industrial hose, including braided, horizontal braided, wire braided, wrapped and braided, wire woven, smooth bore and rough bore. Descriptions of each type of hose are followed with application information and dimensional data. The Gates Rubber Co.

405 Heat Exchanger Tubing — Cited in this 30-pp catalog are typical cases where cupro-nickel or Monel tubing installed in heat exchangers resulted in substantial savings and better efficiency through longer tube life. Describes applications of this tubing. The International Nickel Co., Inc.

VALVES, TRAPS, PIPING

406 Valve Performance Facts — Included in this 36-pp booklet are 32 case histories of cost-saving valve installations. Service applications covered include steam, oil, water, coating fluid, chlorine, phenol, pulp stock, vacuum, others. Crane Co.

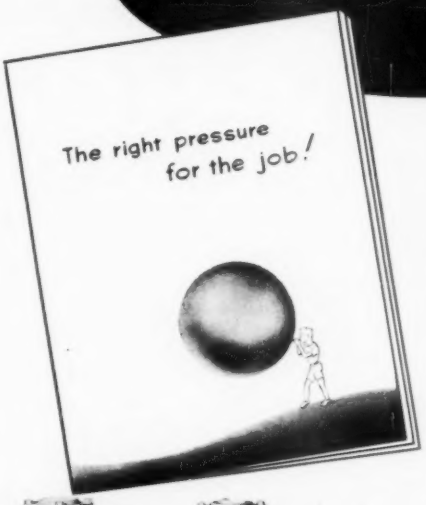
407 Plug-Type Valves — Long-life features of company's stainless steel plug-type valves are stressed in 6-pp Form 202-A. Cutaway view illustrates important design and operation features. Jenkins Bros.

408 Corrosion Resistant Valves — Eight-pp Bulletin 8 provides engineering specifications and a discussion of the advantages of Aloyco 20 valves. Basic types and adaptable features of these corrosion resistant valves are presented. Includes data on corrosion tests on this metal with concentrations of sulfuric acid. Alloy Steel Products Co.

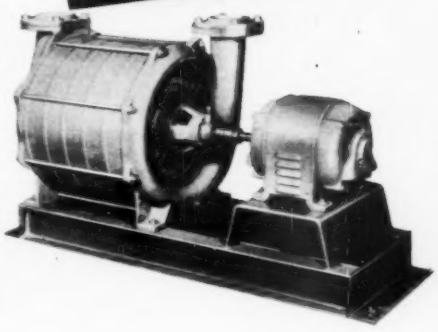
409 Industrial Valves—Bulletin 507V illustrates and describes company's line of industrial valves for control of air, gas, liquids and solids. Features photos and descriptive detail on a variety of valves, including butterfly valves, wafer butterfly valves, slide valves, others. W. S. Rockwell Co.

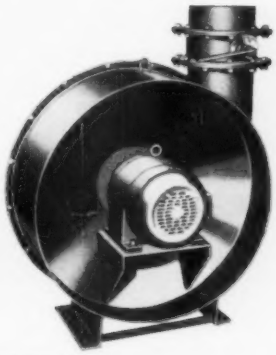
410 Blow-Off Valves—Bulletin B427, 20 pp, describes features and advantages of company's blow-off valves for boiler pressures up to 415 lb. Covers construction details, materials used in the valves, and includes specifications,

NEW BULLETIN



Describes Low Cost Air Supply for Low Pressure Applications





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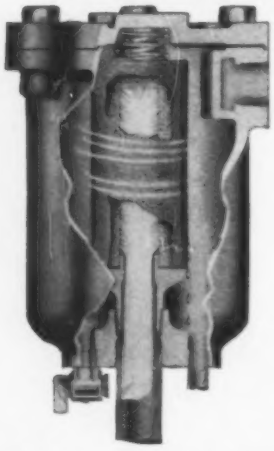
designed to remove oil, water and foreign matter from compressed air lines with minimum pressure drop.



The R. P. Adams Poro-Stone air filter is engineered to efficiently remove entrained oil, water and pipe scale from compressed air lines. Liquid droplets and solids being carried by the gas stream are first removed by centrifugal action in an annular chamber. Secondary filtration is achieved by passing the air or gas stream through a Poro-stone unit. An automatic trap can be provided to discharge the residue from the cyclone chamber.

At rated capacity the filters operate at a maximum pressure drop of only ½ lb., thus insuring delivery of line pressure to the point of consumption.

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0-50 MA, 0-1 to 0-10 Amperes.
0-50 to 0-800 Volts (20 ohms/volt)

DC
0-100 to 0-750 Millivolts
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One popular combination includes these ranges:

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0-150/300/600 V AC } 50-800 cycles
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Pioneers in the Manufacture of Graphic Instruments

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DATA FILE

(Begins on page 166)

weights and dimensions, tables of average physical and chemical properties of materials, photos of typical installations, etc. Yarnall-Waring Co.

411 Gate Valves—Catalog Section A features a line of leakproof gate valves incorporating a double sealing action. A cutaway view showing engineering features is included, as well as tabulated dimensional data, diagrams, and installation and operation instructions. Hamer Valves, Inc.

412 On Steam Traps—Catalog K is an enlarged 48-pp manual and steam trap catalog. New material provided includes open float and thermostatic traps, pipe strainer to 6 in. in steel and semi-steel, and helpful steam pipe sizing tables. Discusses fundamentals of good trapping, trap selection, installation, testing, trouble-shooting, and repairs. Armstrong Machine Works.

413 Glass Pipe and Fittings — Corrosion-resistant qualities of this Pyrex brand glass pipe and fittings which make it suitable for use under corrosive conditions are described in 44-pp Bulletin PE-3. Operating temperatures, physical characteristics, installation procedures are covered and specifications and dimensional drawings given. Corning Glass Works.

414 UPVC Pipe, Fittings—Technical data and installation information on unplasticized polyvinyl chloride pipe are provided in 24-pp Booklet TTP119. Also gives specifications for threaded and socket types of UPVC fittings, valves and flanges, of normal and high-impact material. Tube Turns Plastics, Inc.

OTHER EQUIPMENT

415 Industrial Finishing Equipment—Catalog A 657, 12 pp, describes a complete modern finishing system for cleaning, rust proofing, drying, painting and finish baking. The R. C. Mahon Co.

416 Classifying Systems — This bulletin covers major advantages, industrial applications and design features of high efficiency classifying systems for efficient separation or dedusting of dry powdered materials. Includes details on operation, flexibility of arrangement, power requirements, construction. Buell Engineering Co., Inc.

417 Special Blast Cleaning—Photos and schematic drawings are used in 34-pp Catalog 105-D to show how airless blast cleaning, air blast cleaning and wet blast cleaning has been employed in specific applications. Short case histories relate the experiences of more than 50 companies in solving special cleaning problems. Wheelabrator Corp.

418 Cooling Towers—Featured in 20-pp Catalog DFA-58 is company's double flow Aquatower, combining high efficiency with low silhouette. Specifications and engineering data are included, as well as dimensional drawings showing construction features of the cooling towers. The Marley Co.

419 Equipment Selector Charts—Bulletin CE-50, 20 pp contains selector charts on corrosion-resistant equipment for process industries. Tables cover general considerations in selection of material, physical properties, corrosion resistance, techniques and skill in manufacture of equipment. Describes rubber and plastic pipe, tubing and fittings; valves; pumps. Amerace Corp., American Hard Rubber Div.

420 Heat Exchangers—Bulletin GC-1054, 12 pp, describes features of company's heat exchanger with pumped boiler water circulation. Materials of construction are described and material specifications and operating pressures tabulated. Cost and performance advantages offered by use as instantaneous water heater, and as radiation heater are detailed. Bell & Gossett Co.

421 Special Fire Protection—Devoted to special hazard fire protection, this 44-pp booklet covers both equipment and methods. Tells how to recognize special fire-hazardous conditions in a plant. Discusses in detail major types of fire protection, telling how each functions, giving its advantages and limitations, and illustrating some examples of successful use. Two features of interest are a discussion of fire itself and an at-a-glance selector chart. Grinnell Co., Inc.

422 Chemical Specialties—This 36-pp catalog features chemical specialties for industry, including liquid hand soaps, floor waxes, floor finishing products, floor cleaning products, industrial lubricants and cleaners, germicides and deodorants, cleaning specialties and insecticides. Descriptive information on each of the products is given, including use. Huntington Laboratories, Inc.

423 Fighting Corrosion With Corrosion—Cathodic protection against rust and corrosion is the subject discussed in this illustrated 10-pp bulletin. Describes the corrosion battery, corrective measures, cathodic protection battery. Electro Rust-Proofing Corp.

424 Filters, Strainers — Industrial Catalog 1058, 48 pp, provides application and engineering information on company's line of micro-filters and precision strainers. Fuel filters, full flow and by-pass lube filters, dry type air filters, air separators, and metal edge strainers for fuel lube and industrial use shown. Purolator Products, Inc.

425 Shop Equipment—Work benches, tool stands, shelving and other pressed steel equipment for the shop, laboratory and assembly line are shown in 8-pp Form 2299. Construction features and specifications of size, top material, equipment variations given. Standard Pressed Steel Co.

426 Cyclone Separators—Featured in 8-pp Bulletin 712 are company's cyclone separators and pipe line after-coolers designed to provide cool, dry and clean compressed air and gases. Cutaway views illustrate component parts and features, and capacity tables facilitate selection. Typical installations are also pictured. R. P. Adams Co., Inc.

427 After Cooler—Bulletin 130, 8 pp, features an after cooler which is independent of a large supply of cooling water and consistently reduces compressed air temperatures to below ambient. A cutaway diagram explains after cooler functions; photos illustrate operation. Niagara Blower Co.

428 Testing Skin Cleansers—The use of radioactive material to check the cleansing efficiency of various materials and formulas used in production of skin cleansers by this manufacturer is described in this brochure. Basic steps in the test are illustrated. The Sugar Beet Products Co.

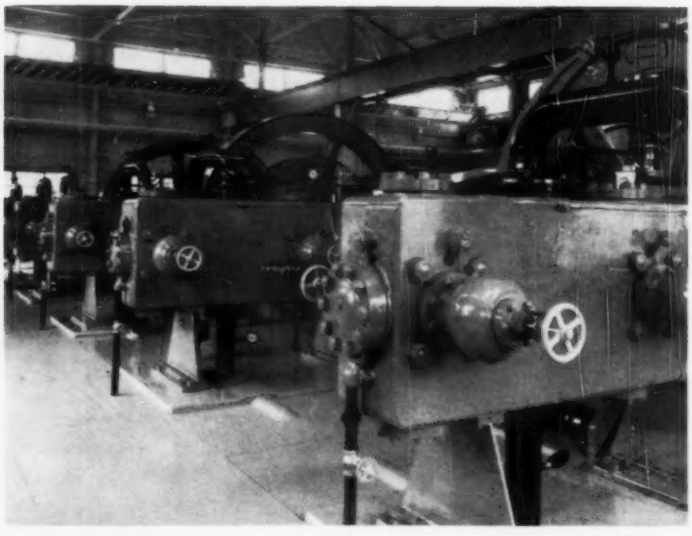
429 Compressed Air Dryer—Featured in 12-pp Catalog D2-858NE5 is a dryer designed to provide dry, clean, safe compressed air for a variety of industrial uses. Describes features and operation, and includes dewpoint graphs. Van Products Co.

430 Preheating Combustion Air—This well-illustrated 36-pp booklet explains fuel savings and increased performance made possible by using waste heat in flue gases to preheat incoming combustion air. Also covers increased boiler output. Air Preheater Co.

431 Chemical Products—This 8-pp industrial catalog describes production and maintenance chemicals, including sealing compounds, cements, oils and lubricants, hydraulic fluids, service products, and others. Table lists recommended sealants for specific applications. Permatex Co., Inc.

Quick Case History—reading time 39 seconds

How Hagan CS Inhibitor keeps compressors corrosion-free at UNITED FUEL GAS COMPANY



THE PLANT: Major gas company uses 1000-hp compressors to maintain high gas pressure for transmission. Eight compressor stations are involved throughout West Virginia.

THE PROBLEM: Compressor cooling water is in closed system utilizing fin fans for temperature drop. Pipes became severely corroded due to oxygen attack. At one compressor station, for example, this corrosion caused failure of 2" black iron piping on discharge side of horizontal compressors.

THE SOLUTION: Hagan CS Inhibitor is now being used in a number of compressor cooling systems. Since introduction of CS Inhibitor, no maintenance or replacement of treated system has been necessary except to repair damage which accrued before treatment was started. Cooling systems have no present problem with corrosion.

TEST RESULTS: Recent 90-day test run on 2 cycle vertical compressor engines showed a corrosion rate (mg/dm²/day) of 0.02 for steel, 0.01 for copper. Other tests taken at the other installations have shown similar results.

GET FULL INFORMATION on how your equipment can give longer life with less maintenance and more effective operation by using Hagan CS Corrosion Inhibitor in its closed water system. Write for Bulletin No. 410-12-3.

HAGAN CHEMICALS & CONTROLS, INC.

HAGAN BUILDING, PITTSBURGH 30, PENNSYLVANIA
DIVISIONS: CALGON COMPANY, HALL LABORATORIES
IN CANADA: HAGAN CORPORATION (CANADA) LIMITED, TORONTO

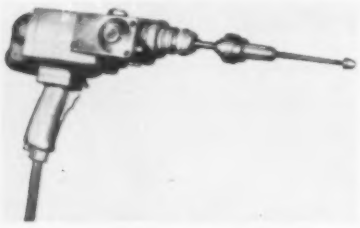
For more facts circle 612 on Reply Card

NEW PRODUCTS

(Begins on page 120)

47—TUBE EXPANDER DRIVES for exchangers, boilers

Two air-driven heavy duty models have been added to the Torq-Air-Matic line of automatic tube expander drives. Model B (shown), is available in three versions, from 38 to 22 ft-lb torque and from 450 to 750 rpm, and is designed for heat



exchangers used in oil refineries, chemical plants, and other processing operations, and may be used with ferrous or non-ferrous tubes up to 1½ in. OD. Model C, 75 ft-lb torque and 200 rpm, is for tubes used in package or power plant boilers, re-boiler or waste heat boilers, ammonia condensers, sulphite evaporators, air-preheaters. It will roll up to 3 in. in ⅝-in. sheet. Like the original Torq-Air-Matic model, these drives measure torque output directly at the mandrel by mechanical device. Thomas C. Wilson, Inc.

48—CONVEYOR IDLERS in varied sizes and types

Offered in five series and in widths ranging from 14 to 84 in., this line of belt conveyor idlers increases the number of this manufacturer's idler variations from 38 to 64. In all, the line includes more than 630 different types and sizes. The five series of idlers, Series 5000 through 9000, make possible exact matching of idlers to specific operating requirements of all belt conveyor applications. In addition to flat, 20-deg and 45-deg troughed idlers, others included are rubber cushioned idlers for use at loading points; positive action and actuating disc training idlers, and variable troughed idlers. Link-Belt Co.

49—WATER TUBE BOILER ready for installation

Model AS, a packaged boiler, is available in capacities from 4000 to 13,000 lb of steam per hour. Its basic construction is the A type tube arrangement. According to manufacturer, efficient heat transfer and protection for refractory have been achieved without baffles; tangent tubes in the furnace wall eliminate refractory baffle between the furnace and convection tube pass of boiler. The mechanical draft fan is mounted at the rear of the boiler, providing positive air cooling of furnace floor and front firing wall. This feature is also said to result in more uniform air supply to the burner and better flame formation. Rotary burners are standard on all sizes. Model AS Boilers are furnished complete even to refractory insulation and steel jacket, and require no special foundation other than their own structural steel base. Superior Combustion Industries, Inc.

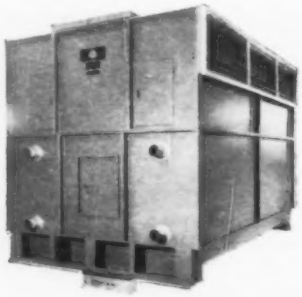
More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 161-162.

50—CENTRIFUGAL PUMPS feature standardization

Single-stage centrifugal pumps in this manufacturer's LP[1] series are designed to take advantage of ASA preferred number standardization, and are announced as offering such other features as relatively few sizes, broad range of performance, with

This Self-Contained Fluid Cooling System

. . . gives most accurate temperature control



Applied in cooling industrial machines or processes to temperatures approaching the ambient wet-bulb, the NIAGARA *Aero* HEAT EXCHANGER is independent of any more than a nominal water supply or disposal. The coolant system is a closed one, free from dirt and maintenance troubles.

Heat is removed from your process *at the rate of input*, giving you precisely the temperature you require and assuring the quality of your product. Heat may be added to prevent freezing in winter or for better control in a warm-up period. Liquids or gases are cooled with equal effectiveness.

Heat is rejected outdoors. Only the little water evaporated on the cooling coils in the air stream, or discharged to prevent hardness build-up, is consumed.

Niagara sectional construction saves you much installation and upkeep expense, gives full access to all interior parts and piping. Your equipment always gives you full capacity and "new plant" efficiency.

Write for Niagara Bulletin No. 132 for complete information

NIAGARA BLOWER COMPANY

Dept. PE-12 405 Lexington Ave., New York 17, N.Y.

District Engineers in Principal Cities of U. S. and Canada

For more facts circle 613 on Reply Card

CLASSIFIED ADVERTISING

HELP WANTED

ELECTRICAL ENGINEER

Excellent opportunity for graduate Electrical Engineer in a Southern four machine Pulp and Paper Mill which is generating and using 32,000 KW of electrical energy. This is a staff position reporting to the General Superintendent, Power and Maintenance, and will allow close contact with Plant Engineering, Power and Electrical Maintenance. At least three years industrial experience is required. Please send resume of experience and salary requirements to:

Employment Manager
Camp Division
Union Bag-Camp Paper Corporation
Franklin, Virginia

EQUIPMENT FOR SALE

Stainless Precision Tools

Stainless Steel T-Squares, Triangles, Straightedges, and Precision Drawing Instruments and Scales.

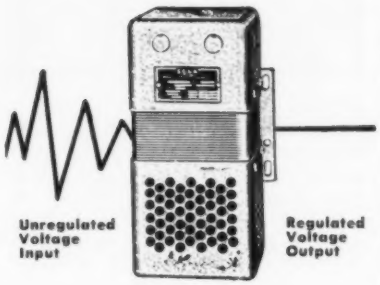
CATALOG ON REQUEST

THEO. ALTENEDER & SONS

Since 1850

1219 Spring Garden St., Philadelphia 23, Pa.

End your line voltage variation troubles



If you are plagued with excessive line voltage fluctuation, a Sola Constant Voltage Transformer can "smooth out" most of your power problems as quickly as it takes to install one of these dependable units. It's a simple and inexpensive method of voltage stabilization that can save you time and dollars.

These compact, reliable units provide voltage output regulated within ±1% with line voltage fluctuations as great as ±15%. Regulation is automatic and continuous. They are self-protecting against short circuits on output or load circuit.

Your maintenance man can install a Sola Constant Voltage Transformer in little time. He has no adjustments to make. There are no tubes, no moving or renewable parts. Once installed, these stabilizers need no further attention.

Guard against lighting failures

For mercury lamps . . . outages due to line voltage fluctuations can be avoided by using Sola Constant Wattage Mercury Lamp Transformers. *For fluorescent lamps . . .* Sola Constant Wattage Fluorescent Ballasts will provide positive lamp starting.

These fluorescent and mercury lamp ballasts operate lamps at full rated light output, regardless of line voltage fluctuations. They provide cool, dependable, ballast performance.

For full information write for literature

Sola Electric Co., 4633 W. 16th St., Chicago 50, Ill.
A Division of Basic Products Corp.

SOLA

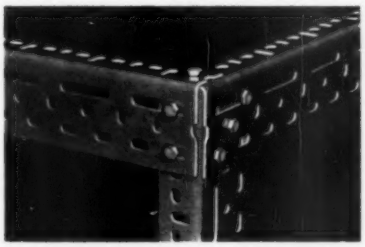
Constant Voltage Transformers
Regulated DC Power Supplies
Mercury Lamp Transformers
Fluorescent Lamp Ballasts

For more facts circle 614 on Reply Card

minimum number of pumps, efficiency, interchangeability of parts, and rugged construction. Stuffing box or mechanical seal construction is available. Design advantages stressed for the LP Pumps include the fact that by simply rotating the casing around the shaft center, the pump discharge can be placed in any position. Also, casings are all of the "centerline discharge" type, in which there is no dimension between centerline of pump and centerline of discharge. The discharge pipe is always located in the centerline of the pump, says manufacturer. These casings, due to their centerline discharge are self-ventilating, when installed in the normal position; discharge up. NEMA standard motors are incorporated and a motor designed for extra-quiet operation is also available. Taco Heaters, Inc.

51—PUNCHED ANGLE lets you make it yourself

Hot dip galvanized Equipto Angle is offered in 12- and 14- gage weights and 10- and 12-ft lengths. It is punched with regularly spaced holes



and slots so that it may be cut to any length and bolted together to make storage racks, tables, guards, frames, carts, others. Bolts and nuts are furnished, so the only steps required are cutting angles to length (a one-stroke cutter is available) and bolting them together. Idea Book 299 pictures some uses. Equipto.

52—SPRAY-ON LUBE for open gears, chains, cams

Acrolite Gear-Lube Spray comes in an aerosol can. You simply push the button and spray the grease on the gears or other surface. This lubricant forms a tacky surface within minutes after spraying, and as the gear rotates, there is a stringy webbing action carried from tooth to tooth by their contact with one another. Rotating of gears creates a web of strings that continuously stretches across the tooth faces. Acrolite Gear-Lube is claimed to afford continued protection by redistributing itself over the critical area. Even under wet or dry conditions dusty or clean,

Note imbedded Nylon plug locks screw automatically
SEXAUER
EASY-TITE
Note Fiberglas backing — resists closing squeeze

NEW WAY TO

Prevent Faucet Leaks!

★ **9 out of 10 washers are fastened with screws that are TOO LONG or SHORT. The screws quickly loosen; the loosened washers are destroyed thru grind and squeeze of opening and closing faucets.**

34 years of research uncovers new solution

★ **Now, NEW (Patented) 'Sexauer' SELF-LOCK Monel screws, with an imbedded expanding NYLON PLUG, lock at the required depth AUTOMATICALLY, hold washers FIRMLY! Made of rustproof, noncorroding Monel, heads don't twist off, screw slots don't distort. They are easily removed when necessary, can be re-used repeatedly.**

★ **Used with NEW 'Sexauer' EASY-TITE faucet washers, they make a combination that outlasts past faucet repairs "6-to-1"! EASY-TITES are made of super-tough, pliable du Pont compound (neither rubber nor fibre) and reinforced, like a tire, with a vulcanized layer of Fiberglas. They resist distortion and splitting from shut-off grind and squeeze.**

Hidden costs of faucet leaks!

Faucet leaks are costly! As authenticated by Hackensack, N. J. Water Co. and American Gas Association, stopping just ONE PIN-HOLE SIZE (1/32") LEAK can reduce water waste 8,000 gal. quarterly. If a HOT WATER FAUCET LEAK, water and fuel savings JUMP to over $7.58 QUARTERLY—plus additional savings on MATERIALS, LABOR and costly FIXTURE REPLACEMENTS!

NEW SELF-LOCK screws and EASY-TITE faucet washers are just TWO of the "SEXAUER" line of over 3000 TRIPLE-WEAR plumbing repair parts and Pat'd. precision tools.

A "SEXAUER" Technician in your vicinity will make our NEW 126 page Catalog "H" available. He will gladly consult with you regarding a SURVEY of your plumbing fixtures to determine correct repair parts required and establish reasonable stock levels that avoid both overstocking and shortages—thus providing for efficient stock arrangement and control—all without obligation. WRITE TODAY!

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Gentlemen: *Please send me a copy of your NEW, 126 page catalog "H."*

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Company or Institution _____
City _____
Zone _____ State _____

SEXAUER
WORLD'S LEADING SPECIALISTS IN PLUMBING AND HEATING REPAIR PARTS

For more facts circle 615 on Reply Card

NEW PRODUCTS

(Begins on page 120)

Gear-Lube clings to the frictional surfaces, with a grip that normally outlasts several coatings of conventional lubricants, it is announced. This spray sells for around $2.00 for a 16-oz can. Acrolite Products, Inc.

53—TUB TRUCK keeps parts within easy reach

Model 718, an aluminum tub truck, is described as a "back saver" where individual parts, pieces or parcels

are handled. It features a floating deck with telescoping corner post springs which keep the load within reach of the operator. It comes in many standard sizes and capacities. M. Neushul Co., Inc.

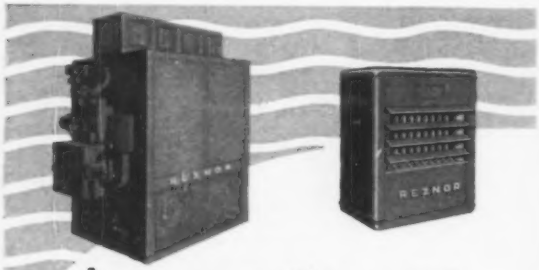
54—FIRE EXTINGUISHERS are "dry chemical type"

In the redesigned D line of dry chemical fire extinguishers are four models with 5-, 10-, 20- and 30-lb capacities. They are announced as featuring "fresh fill" performance including maximum fluidization, gas tightness and simpler operation. They can be had in fire equipment red or high-visibility white. In these extinguishers a redesign of the gas tube is achieved by locating and rearranging the gas ports and adding Neoprene sleeves (to act as check valves) on the tube. When a CO_2 cartridge is punctured, the new tube blasts gas into the extinguisher shell at crucial points to force the dry chemical out through the nozzle in a uniform stream, no matter how packed the dry chemical has become. The Neoprene sleeves serve to prevent dry chemical from escaping the wrong way into the carbon dioxide cartridge. Manufacturer says the tube is so gas tight that the cartridge can be punctured to pressurize the extinguisher and then unscrewed from the cartridge receiver. Even with the cartridge gone, the extinguisher remains pressurized for days, it is claimed. U. L. ratings announced for the four models are 8

B:C, 16 B:C and 20 B:C. The 16 B:C rating of the 10-lb model is reportedly the highest rating given to an extinguisher of that size. Ansul Chemical Co.

55—PROCESS PUMPS are tripod-mounted, vertical

Figs. 3181 and 3182 are tripod-mounted vertical centrifugal process pumps having stainless steel or other corrosive-resistant metal liquid end or Goulds-Pfaulder glass pump liquid end. With stainless steel or other resistant metal end, the Fig. 3181 is intended primarily for two unusually difficult services: handling of highly volatile, inflammable, toxic, explosive or other dangerous liquids where pumpage must be isolated from the atmosphere; or pumping liquids at extreme temperatures (—320 to 550 F) where liquid end of pump must



low operating cost

Fuel cost is the total cost of operating Reznor gas unit heaters — and you pay only for the heat you actually need and use. Reznor heat is produced and distributed right at the point of need . . . eliminating transmission losses and costly stand-by firing of boilers. These completely automatic units don't require a licensed fireman . . . they don't require any operating labor at all.

LOW OPERATING COST is just one of many reasons why Reznor gas unit heaters are right for so many plant heating jobs. Whether you need one heater to eliminate a "trouble" spot or enough units for a complete plant heating system, ask your Reznor distributor for the complete story or write for your free copy of "Modern Heating."

Look for Reznor under "Heaters-Unit" in the Yellow Pages

REZNOR
WORLD'S LARGEST-SELLING DIRECT-FIRED UNIT HEATERS

Reznor Manufacturing Company, 91 Union Street, Mercer, Pa.

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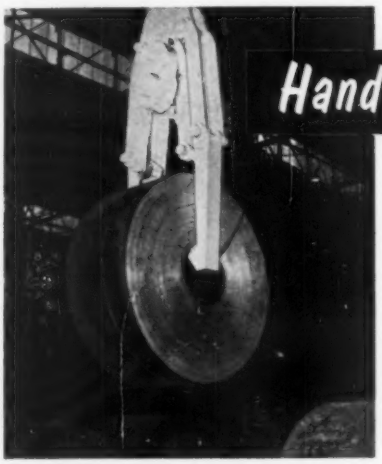

Handling Coil

CHECK THESE
C-F Lifter
ADVANTAGES

- 1 Lifter handles wide range of coil sizes
- Requires minimum of only 10" to 12" between piles — saves storage room
- 1 man operation — eliminates hookers
- Positive grip on coil — no damage to material

• C-F Coil Lifters are saving time and labor in many plants and warehouses because they can pick up, carry and set down a coil of steel faster and safer than any other method. Infinite jaw openings permit handling a very wide range of coil widths . . . carrying legs open fast, stay open until operator closes them on coil. Narrow legs require minimum space between piles —a space saving advantage. Made in motorized models for crane cab or pendant operation as well as manual types with chain wheel, in capacities from 3 tons up. Powered Rotating Heads available. Opening ranges to suit your requirements.

Write for illustrated Bulletin.

CULLEN-FRIESTEDT CO.
1317 South Kilbourn Avenue • Chicago 23, Illinois

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be insulated from the bearings, mechanical seals, driver and free to contact or expand without binding and distortion. These pumps come in nine sizes from ¾-to 3-in. discharge, capacities to 800 gpm, heads to 300 ft.

Fig. 3182 Pumps, with Goulds-Pfaulder glassed pump liquid end, are for use where the liquid to be handled is of highly corrosive nature or where non-adherence of product or no metal contamination is required. All parts which come in contact with pumpage are glassed. These pumps are said to offer resistance to all acids except hydrochloric, even at temperatures to 350 F, and to alkalis at moderate temperatures. They give capacities to 700 gpm, heads to 140 ft. Goulds Pumps, Inc.

56—PLASTIC-COATED GLOVE with boxed-tip fingers

Greater ease of finger movement and added comfort and protection are announced for this all-purpose plastic-coated glove. Featuring boxed-tipped fingers, curved to fit

each finger of the hand, these gloves are said to provide the added dexterity of an "extra set of finger nails" in handling small parts. The glove fingers never hug the hand, it is noted, and thus allow free air circulation. Available with plastic coating on the entire glove or on the palm only. This box-tipped model is claimed liquid proof, resistant to most acids and chemicals, warm and long wearing. Knit wrist, band-top and gauntlet styles for men and women are offered with several coatings. Advance Glove Mfg. Co.

57—CLUTCHES for machine tools, transmissions

Models DO and DOC are wet-type, multiple-plate clutches, built to run in oil and actuated by oil pressure of 100 to 300 psi, depending on application. They are claimed to require no adjustment for wear. Model DOC Clutch has an integral oil collector. A ¼-in. NPTF line connected to the stationary collector makes the clutch ready for use. Model DO

Hobbs HOUR METERS for

MEASUREMENT OF USE

PROTECTIVE MAINTENANCE

Operating Time of Production and Service Equipment — AT A GLANCE!

To obtain maximum use of production and service equipment, it is essential to know the hours of operation. This information permits accurate study of utilization; also provides data needed for protective maintenance which improves performance and lengthens service through regular attention at the right time.

Hobbs Hour Meters indicate to the HOUR and MINUTE the time of equipment operation. Not a revolution counter, but a true timing instrument. ALTERNATING CURRENT meters time the operation of any equipment powered by a-c electricity; DIRECT CURRENT meters, the operation of any equipment powered by internal combustion engine or battery.

● Distributors in Principal Cities

WRITE FOR CATALOG 600

JOHN W. Hobbs CORPORATION

A DIVISION OF STEWART SW WARNER

2054 YALE BLVD. SPRINGFIELD, ILLINOIS

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LOOK beyond the PRICE TAG

DURA SEAL
THE ENGINEERED MECHANICAL SEAL
Plus
• Research and Engineering Council
• Custom-built to Meet Your Specific Need
• Nation-wide Sales and Service
• Interchangeability of Parts
• Twenty-Five Years of Experience
For Further Information . . .
on the complete line of Dura Seal mechanical seals write for Catalog 480- PN
DURAMETALLIC CORPORATION
KALAMAZOO MICHIGAN

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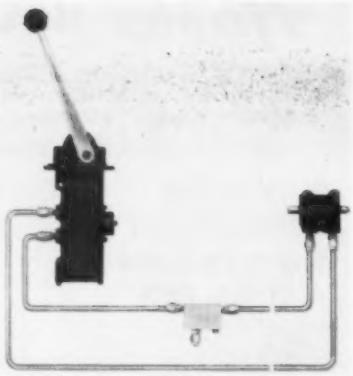
NEW PRODUCTS

(Begins on page 120)

is identical in design, except that the around-the-shaft collector is omitted, shortening the clutch somewhat. It is noted that an end shaft seal can be used on this model by drilling the shaft accordingly. Both types of clutches come in sizes from 3- to 7-in. diam, and can transmit up to 137 hp and up to 690 lb-ft of torque. With hydraulic balance, speeds up to 5000 rpm are allowable for the smallest sizes and up to 3250 rpm for the largest. Manufacturer states that since piston ring seals are used, Models DO and DOC must be installed within a transmission housing because of ring leakage, and they should be actuated by lubricating oil since leakage is normally allowed to fall to a sump. Twin Disc Clutch Co.

58—SLAVE UNIT for remote control applications

Announced as considerably less expensive than rotary type units, this straight-line slave unit has a body measuring 2½ in. high and 1-15/16 in. wide. Overall length of the piston is 3⅞ in. Length of stroke



is 1 in. with a thrust capacity of up to 1000 lb. The slave unit can be mounted in any position and connected to governors, throttles, valves, equalizers, clutches and similar devices for remote control or positioning purposes. The entire remote control system is self-contained and hydraulic. Slave piston and master control lever maintain synchronization at all times, it is noted. An integral filler-bleeder fitting eliminates need for accessory pressure equipment. The master unit is designed to automatically compensate for expansion and contraction of fluid due to temperature variations. The Hydronic Co.

59—ELECTRONIC SCANNER has working advantages

Maintenance of process stability and close reproduction of operating conditions are advantages announced for the Kybernetes Scanning System. In an initial installation, it checks several hundred thermocouples in reactor shells and on other operating equipment. This digital variable indicator and temperature monitoring system scans thermocouples at a rate of 5 per second and determines when any exceed preset common off-normal set point or a pre-set common alarm set point. If the first setting is exceeded, the time and identity of the off-normal point is recorded on an adding machine-type printer. If the second (higher) setting is exceeded, the system shuts down the plant.

This system also has a digital display panel so the thermocouple inputs can be programmed through an analog-digital system and be viewed at the panel. Digital trends may be observed at any of these points. Ability to centrally perform these functions is based on utilization of electronic comparing and analog to digital conversion circuits coupled with high reliability relay matrices for input scanning. Hagan Chemicals & Controls, Inc., Kybernetes Div.

For more facts circle 620 on Reply Card

The easiest — and quickest — way to order bulletins and catalogs described in this magazine is to use the postage-free Reader Service Cards on pages 161-162.

All you need to do is circle the item numbers of those you want. Then fill in your name, job title, company name and address — and mail the card.

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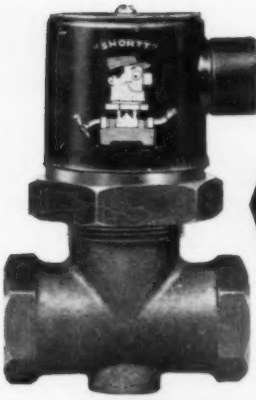


Introducing "SHORTY"

A NEW SERIES of ALL-PURPOSE SOLENOID VALVES
TYPES JJ and KK

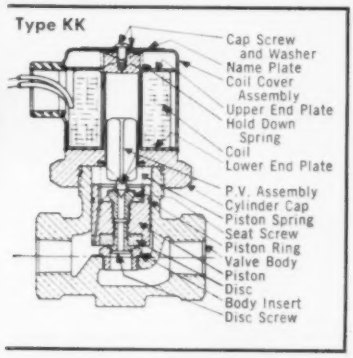
Atkomatic Quality at a New Low Price

"Shorty" is a compact 2-way pilot-piston electric operated valve designed to handle a variety of jobs. Although low in price "Shorty" has the same rugged, trouble-free construction as its bigger brothers, many of whom are still in operation after 20 years' continuous service. And "Shorty" (Types JJ and KK) are available for immediate delivery.

for **AIR & GASES TO 250 PSI** · **WATER TO 150 PSI** · **OIL TO 75 PSI** · **STEAM TO 25 PSI**

- Pipe sizes: ¼", ⅜", ½", ¾" and 1"
- Bronze construction
- Stainless steel pilot
- Unbreakable piston rings
- Replaceable resilient seats

"SHORTY" says: "If the job calls for a rugged solenoid valve, call for me."



send for bulletin 501

ATKOMATIC VALVE CO., INC.
545 West Abbott Street, Indianapolis 25, Indiana

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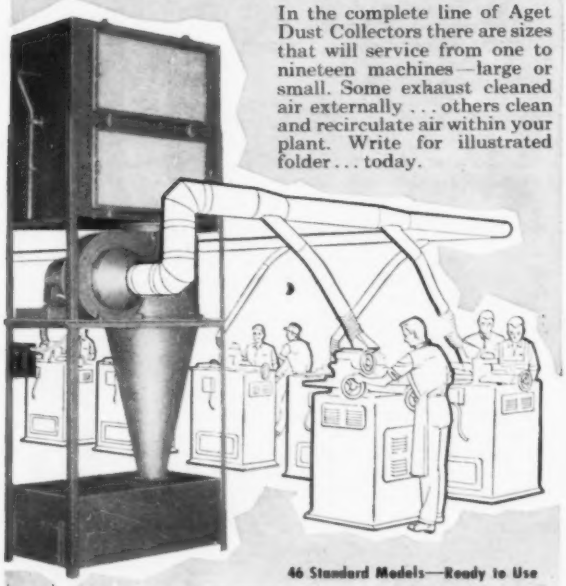
just **ONE** **DUSTKOP STOPS DUST**

heavy duty unit services up to 19 MACHINES

In the complete line of Aget Dust Collectors there are sizes that will service from one to nineteen machines—large or small. Some exhaust cleaned air externally . . . others clean and recirculate air within your plant. Write for illustrated folder . . . today.



46 Standard Models—Ready to Use

AGET manufacturing company
1388 Church Street • Adrian, Michigan

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The dial thermometer at its best

Something much finer in a dial thermometer: finer because it is the bourdon tube type of thermometer at its best . . . embodies the greater precision and lasting accuracy of the Marsh Pressure Gauge.

Both vapor tension and gas-filled types are available in either distant reading or rigid stem types. In the broad Marsh line you have a complete selection of temperature ranges, case sizes, styles, and finishes.

Ask for the Thermometer Catalog

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MARSH INSTRUMENT CO. Sales Affiliate of Jas. P. Marsh Corp.
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Sect. 15, Houston, Texas

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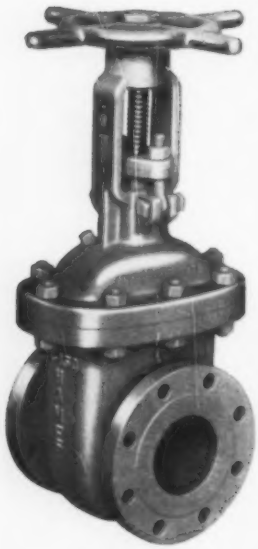
New Hamer "Wedge Seal"

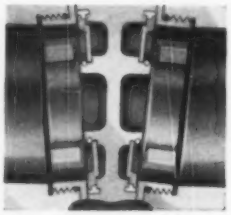
LEAKPROOF GATE VALVE

- *"Dual" Leakproof Sealing Action*
- *Positive Shutoff Upstream — Downstream*
- *Serviceable in the Line*



The new Hamer *Wedge-Seal*, unlike conventional Gates, incorporates a two-way sealing action that insures absolute line shut-off even on lines handling customarily hard-to-hold fluids. As the wedge is lowered to its precision metal-to-metal fit, a Teflon* seal in each side of the wedge compresses against the seats, forming a dual bubble-tight sealing action. Yet, with all of its added sealing quality, the new *Wedge-Seal* costs little more than a regular gate. Send for free literature today. See for yourself how a Hamer *Wedge-Seal* can actually pay for itself.

*RTM DuPont



Renowned for their inert characteristics, Teflon seal rings used in the new *Wedge-Seal* have amazing durability, can be replaced, when necessary with minimum effort.

Hamer VALVES INC.
2919 Gardenia Avenue, P. O. Box 1851, Long Beach 1, Calif.
Representatives throughout the world

HAMER VALVES, INC.
Box 1851, Long Beach 1, Calif.
Please send immediately your Wedge-Seal Gate Valve Bulletin WS-1.
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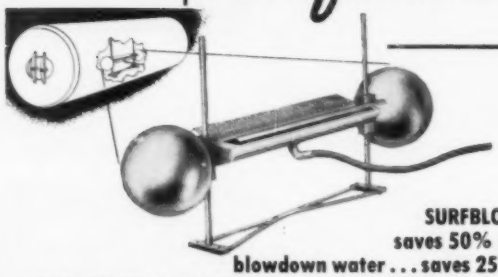
For Sensational Savings in the Cost of Generating Steam

SurfBlow®
THE FLOATING SKIMMER



SURFBLOW saves 50% on blowdown water . . . saves 25% on water treatment costs . . . amazing savings on fuel.

SURFBLOW removes boiler water impurities at point of greatest concentration. Removes more solids than conventional methods. Steam is cleaner . . . less carryover.

Nothing to wear out, no moving parts, no maintenance. Stainless Steel Skimmer. Easy to install. Operation completely automatic.

Ask for case histories. *Write for bulletin today*

BOILER SPECIALTIES CORPORATION
712-Box 485
GARY, INDIANA

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7 WAYS YOU SAVE
with USG Industrial Thermometers

You get top quality
Gotham Industrial Thermometers are made by U.S. Gauge, a leader in precision instrument manufacture.

You get high accuracy
Gotham thermometers are calibrated under strictest controls with permanent reference points etched on lens.

You get good readability
Gotham thermometers feature magnifying glass tubes and highly-visible "Red-reading Mercury" for extra-sharp readability.

You get better response
USG design assures efficient heat transfer through bulb chamber for exact response.

You get longer life
Gotham thermometers are ruggedly built to "take it." Your maintenance and replacement costs are cut.

You get wide choice
Seven types of angle mounting. Ranges from —40° to 950° F. Sizes: 7, 9, 12 inches.

Cost is low!
No finer construction, features or performance anywhere for the price. Start your big USG savings now. See your USG distributor, or write for Catalog 101.

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UNITED STATES GAUGE USG
Division of American Machine & Metals, Inc., Sellersville, Pa.

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Tack-welding cast iron cones to carbon steel vortex tubes of gas scrubber. Ni-Rod "55" Electrodes make ductile, crack-free joints. Scrubbers made by Aerotec Corp., Greenwich, Conn.

Weld cast iron to carbon steel ...No preheat...no cracking... with Ni-Rod "55" Electrode

Joints were cracking up – between cast iron cones and carbon steel tubes in these gas scrubbers. Welds made with iron and mild steel electrodes were just too brittle – they cracked when chipped, broke when shipped.

Weldors switched to Ni-Rod "55"* Electrodes, and now they're standard. Why? Steven Paulo, Aerotec Superintendent says, "I've never seen a crack in a Ni-Rod '55' weld. And any weldor with normal skill can do a good job." Ni-Rod "55" offers you another big advantage – rarely do you have to pre-heat.

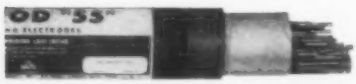
You can get trouble-free welds between cast iron and mild steel in all your jobs – with Ni-Rod "55" Electrode; available from most jobbers.

See in Inco's booklet "Repair Cast Iron Parts Quickly and Easily" how other shops pare costs. Yours for the asking.

*Registered trademark

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street New York 5, N. Y.

INCO



INCO WELDING PRODUCTS

ELECTRODES • WIRES • FLUXES

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Load-Rated* DOES THE JOB!

Setting 108" Steel Pipe With Crosby-Laughlin Load-Rated Shackles

Crosby-Laughlin* LOAD RATED Shackles are demanded on jobs where safety is essential! "Takes the guesswork out of buying fittings" say users of the LOAD-RATED Line. Quality steel is drop forged—heat treated for toughness. *Order capacity* for the job—*see* guaranteed capacity stamped on LOAD-RATED Fittings! Safety is no accident when you order from the *world's most complete line* of drop forged fittings for wire rope and chain. Sold by construction, industrial and mill supply distributors. Ask for free catalog.

*Trademark

CROSBY-LAUGHLIN Division
AMERICAN HOIST & DERRICK COMPANY
FT. WAYNE, INDIANA

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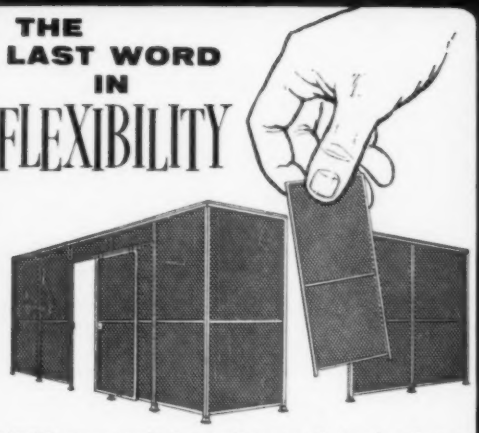
WIPCO WIRE PARTITIONS

THE LAST WORD IN FLEXIBILITY



WIPCO woven-steel wire partitions are designed to fit any area, regardless of height, location of doors and other openings, etc. Easy and economical to erect, your own men can put them up without outside help! Use them over and over again, salvaging each individual section for use in new erections. Available in *standard* sections from stock—or *custom-built* for any requirement, WIPCO partitions are easy to paint and clean—require little or no maintenance! For increased efficiency and flexibility at lower cost, get the facts on WIPCO wire partitions!

Write Today for Bulletin P-55!
WIRE & IRON PRODUCTS INC.
1739 SIXTEENTH STREET, DETROIT 16, MICHIGAN

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When you buy Motor Starters – –

YOU PAY FOR OVERLOAD PROTECTION

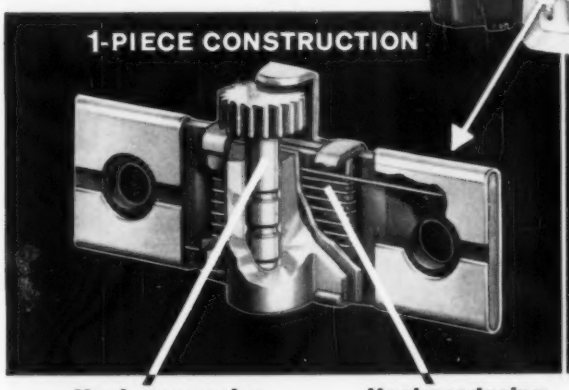
Only ONE-PIECE Overload Relays give 100% Protection • Only with ONE-PIECE construction can you *know* you've installed the heater correctly. Only with ONE-PIECE construction can you *know* the heater is exactly centered, or properly positioned, so that it performs according to its rating. Only with ONE-PIECE construction can you *know* your motors have full protection.

Only Square D has ONE-PIECE Construction • ONE-PIECE construction *eliminates* any possibility of heater misalignment. Square D melting alloy thermal overload relays can be installed only one way. They are tamperproof. They are factory-assembled, are *individually* calibrated and tested. Repeated tripping will not affect accuracy

Insist on Square D melting alloy thermal overload relays

***Write** for Bulletin SM-275 for the complete story on Square D starters with ONE-PIECE thermal overload relays. Address Square D Company, 4041 N. Richards St., Milwaukee 12, Wisconsin.*

...BE SURE YOU GET IT!



Heat-responsive element (solder pot) provides accurate response to overload, yet prevents nuisance tripping.

Heat-producing element is an integral part of overload unit. It's permanently joined to solder pot, can't become misaligned.

Individual factory inspection of every Square D melting alloy thermal overload relay means performance you can trust. Each unit is calibrated and thoroughly tested to make sure it will perform according to its rating.

EC&M HEAVY INDUSTRY ELECTRICAL EQUIPMENT...NOW A PART OF THE SQUARE D LINE

SQUARE D COMPANY

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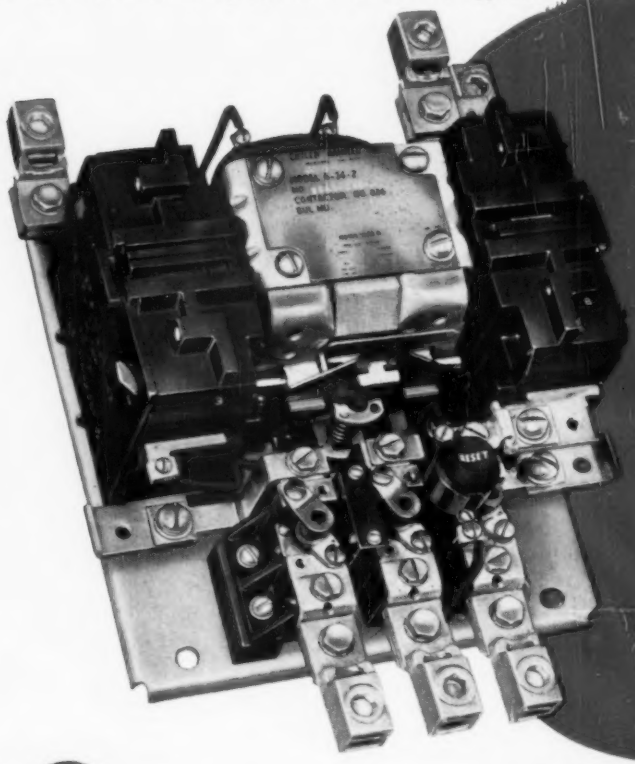
50 Hp 220 Volts, 100 Hp 440/550 Volts Max. Polyphase



New SIZE 4 STARTER

. . . another Cutler-Hammer Three-Star achievement

New *compact design saves valuable panel area*

New *parallel contact design provides increased electrical life at full capacity*

New *low mass movable members insure superior mechanical life*

This is the new Cutler-Hammer NEMA Size 4 Starter . . . industry's first large horsepower starter offering all the desired features of the famous Cutler-Hammer Three-Star Motor Control line. Smaller, more compact, this new starter simplifies control panel design and saves valuable panel area. Tests of the new parallel contact structure show vastly improved electrical life even when operated at full capacity. Further, this new design reduces the size and weight of the movable members resulting in less impact wear and unsurpassed mechanical life. We've tested it against all others, why don't you? The new Cutler-Hammer Size 4 Starter ☆ installs easier, ☆ works better, ☆ and lasts far longer. Get all the facts today. Write for the new descriptive bulletin EN125-Y274, Cutler-Hammer Inc., Milwaukee 1, Wisconsin.

Look for these outstanding features . . . you'll find them only in Cutler-Hammer Three-Star Motor Control

- U-shaped cover easily removable for unobstructed inspection and accessibility
- Straight through wiring . . . line terminals at the top, load terminals at the bottom
- New pressure type terminals cut wiring time and effort
- Adjustable overload relays can be set to trip within 3% of full load motor current
- Precision cast overload sensing coils can't lose their accuracy
- Widely desired three-phase, three-coil overload protection is a standard optional feature . . . no special attachments or enclosures
- Indestructible molded magnet coil . . . color coded for positive voltage and frequency identification
- Easily installed convertible electrical interlocks require no special adapters . . . provide up to four extra control circuits
- Available as non-reversing, reversing, and multi-speed contactors and starters in the open type, NEMA 1, and all special purpose enclosures.

CUTLER-HAMMER CONTROL C-H

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PUBLICATION NO: 168

REEL NO: 9

TITLE: PLANT ENGINEERING

VOLUME: 13 DATE: January-December 1959

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